PEST CONTROL

JUNE
1954

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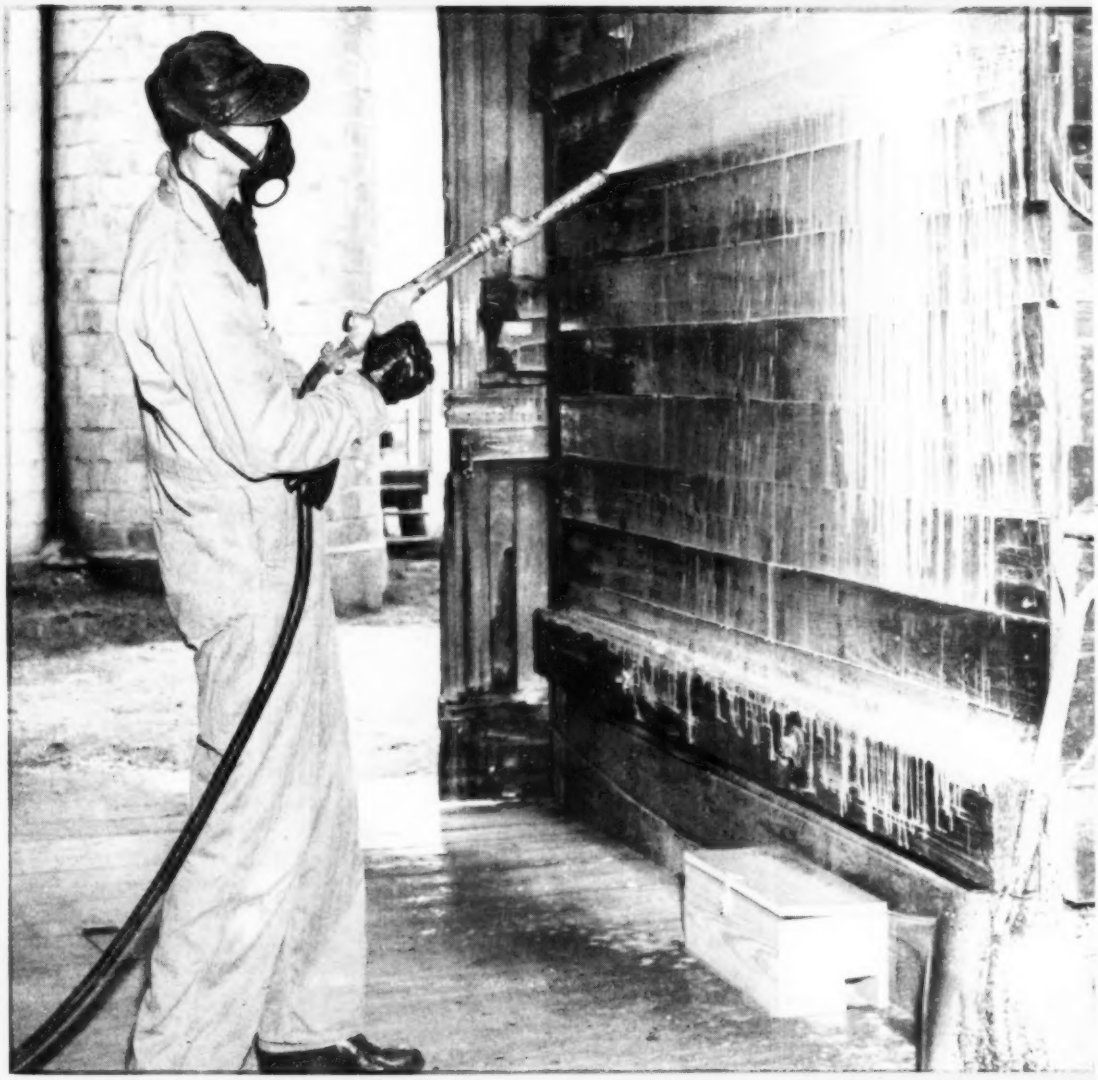
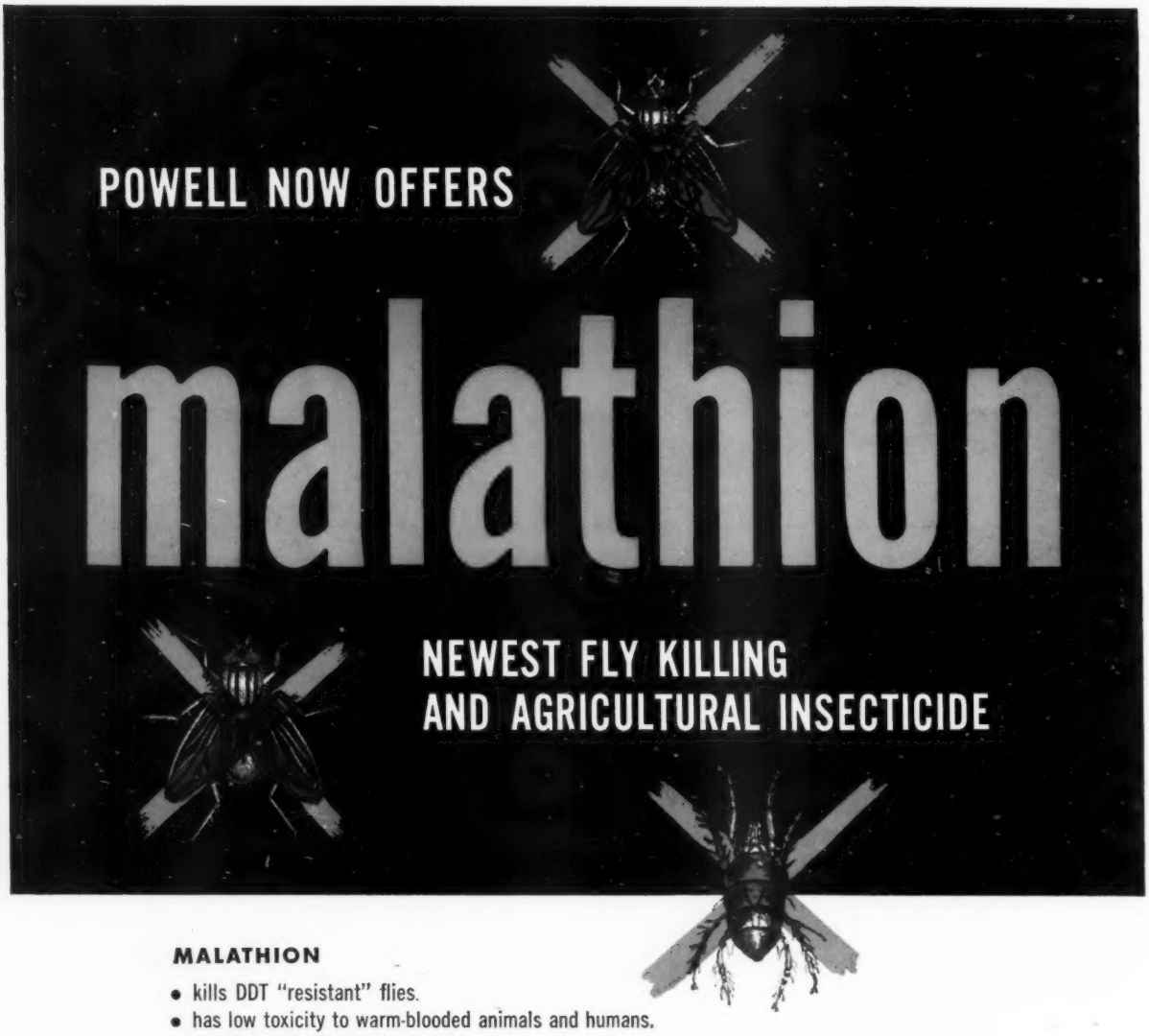


Oklahoma PCO Tillman Zeigler sprays low toxicity emulsion, such as those recommended in lead article, in one of the hundreds of grain elevators now being treated by PCOs in the grain belt. In keeping with recommended safety precautions Zeigler wears protective mask and gloves. Note locked rat bait station placed next to wall near open door through which rats can easily enter. Because of the growing demand for PCO services in the grain sanitation field, this issue is loaded with cereal pest control features.

Since 1933

Magazine of the Urban and Industrial Pest Control and Sanitation Service Industries for Over 21 Years



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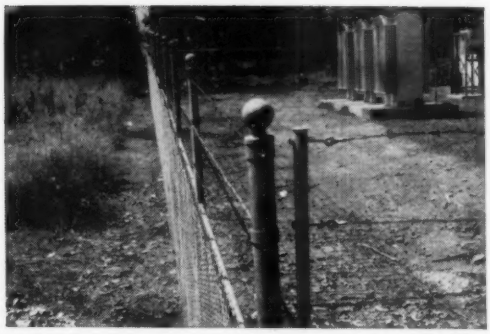
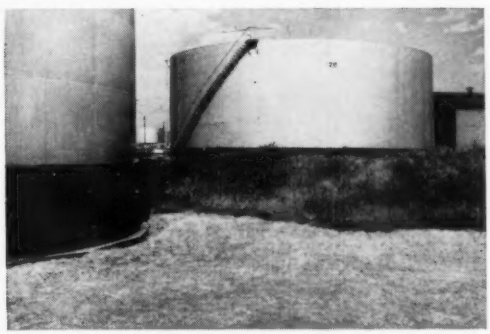
1. "Telvar" W has extra-long residual action. Track on right was treated in April; photograph was taken in August. Ideal for sidings, around loading docks, etc.



2. Note the thorough weed control under and around this security fence and power substation.



3. Fire hazards are reduced around oil storages and pipelines from thorough, long-term weed control with "Telvar" W.

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PCOs and the Centennial

This year professional entomology is commemorating its 100th anniversary of the time in 1854 when Asa Fitch was appointed State entomologist for New York, and Townend Glover became the first Federal entomologist for the Patent Office's agricultural unit.

An official release from centennial committee chairman, David G. Hall, USDA information officer, says, "From this beginning, the profession has grown to 4,500 men and women in Federal and State agencies, schools and business firms." This is a conservative estimate of the numbers now engaged in economic entomology. *Pest Control's* Circulation Department has well over 5,000 names of persons actively working in urban pest control in this country alone. A small percentage of these are trained entomologists, to be sure, but since the entire group makes its livelihood controlling insects that account for a major part of the four billion dollar estimated annual loss they cause, PCOs have played, and are playing a very significant role in the progress of professional entomology.

Important in the chronology of historical events associated with the growth of this profession is the founding of the National Pest Control Association in 1933 (then called the National Association of Exterminators and Fumigators). A handful of companies has been joined by many hundreds more so that now over 800 firms are members of the NPCA. In 1933, 21 years ago, the *Exterminator's Log*, forerunner of today's *Pest Control* published its first issue. Its circulation has increased nearly ten times in those two decades. Urban and industrial pest control operators long have been recognized for their contribution to the advancement of entomological science.

PCOs have worked cooperatively with industry, educational institutions and with government agencies to find answers to fly and roach resistance, to field-test new rodenticides and insecticides, and to develop more effective control measures.

Across the country pest control associations are joining with other entomological groups to observe the first 100 years of professional entomology. Each, in its day to day activities, is working to better our way of life to reduce the costly losses caused by insects and rodents, and to lengthen man's life-span through cleaner food and healthier living conditions.

James A. Nelson

Editor

PEST CONTROL

EVERY MONTH SINCE 1933

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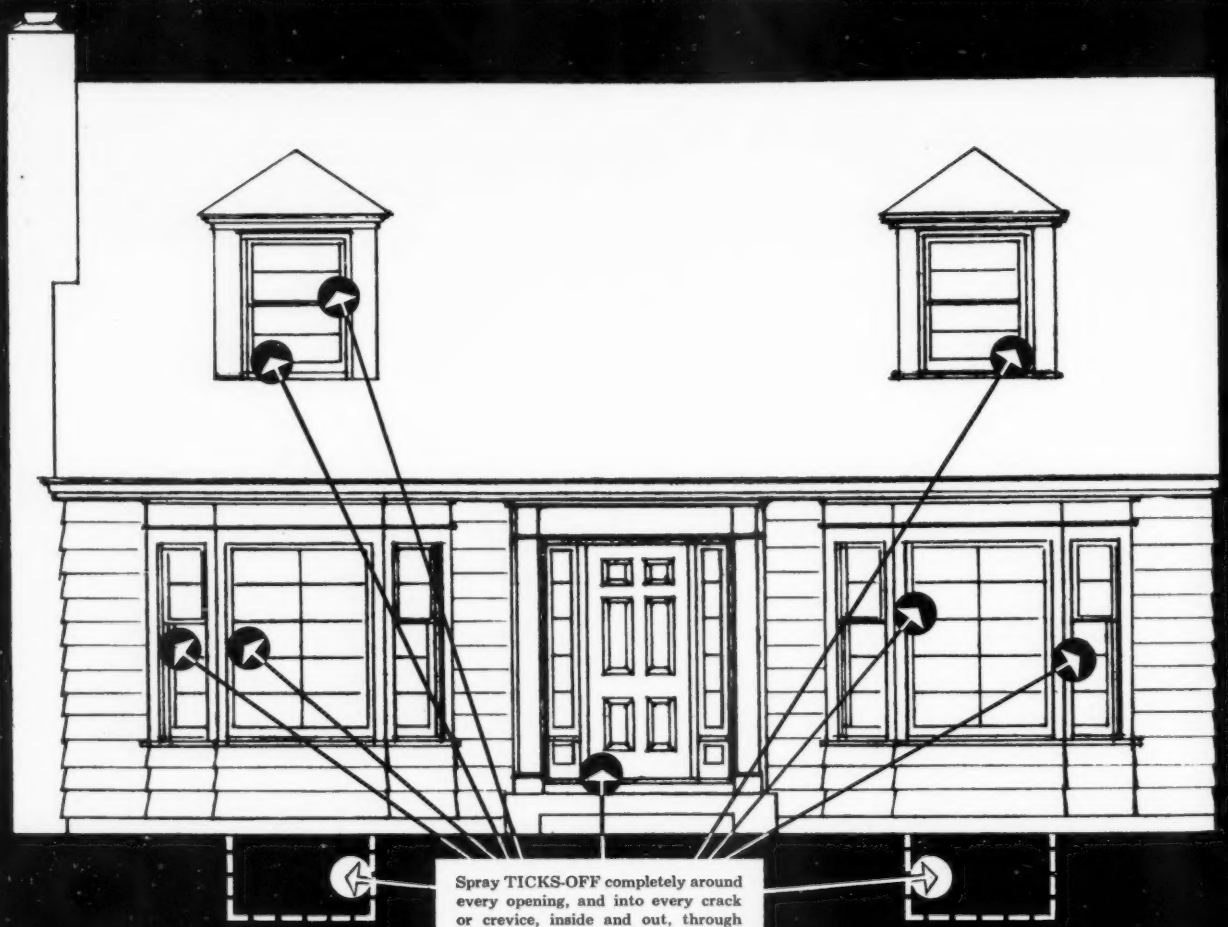
The ONLY SURE ANSWER To



Spray TICKS-OFF completely around every opening, and into every crack or crevice, inside and out, through which Clover Mites can enter. Be sure a residue of TICKS-OFF remains over which mites must crawl.

Hold nozzle of bomb within 2 inches of surface or crack being sprayed.

How To Use TICKS-OFF For Indoor Clover Mite Control

ALL outside and inside openings of the house *must* be treated—windows, doors, basement windows, fan openings, etc.

IMPORTANT! The TICKS-OFF Bomb nozzle should be within two inches of cracks and openings to make sure a film of TICKS-OFF Repellent is on the surface. Inject the spray directly into the cracks between the windows and sash; also the crack where the upper and lower parts of the windows meet. The entire window casing should have a treatment.

In frame houses where the mites are a problem in the floor, TICKS-OFF should be sprayed under the ¼-round molding throughout the house. If infestation is severe, TICKS-OFF should also be sprayed against the sub-floor and joists at the point where they rest on foundation. The movement of the bomb should be approximately one foot of space per second of spray.

America's No. 1 Insect Repellent

Indoor CLOVER MITE CONTROL

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WHY THE TICKS-OFF REPELLENT BOMB PROTECTS AGAINST AND KILLS CLOVER MITES. Since 1945 TICKS-OFF has been used by foresters, lumbermen and other outdoorsmen to mist on clothing to prevent ticks, chiggers, mites and other pests from becoming attached to the skin. At the present time TICKS-OFF is sold in every state and Canada as America's No. 1 spray-on insect repellent for use on the clothing, skin, in and around the home for protection against mosquitoes, flies, chiggers and ticks. Its safety has been completely proved.

CLOVER MITES are not insects. Like chiggers and ticks, they belong to the *Arachida* family. Since TICKS-OFF Repellent has proved so effective for other pests in the Arachida family it is understandable why it would give completely satisfactory protection against clover mites.

PRALYTEX ROTENONE* in TICKS-OFF is the secret of effective clover mite control. This ingredient, combined with glycols and propellent gas in TICKS-OFF, gives a long-lasting residual treatment.

CLOVER MITES, when active, crawl virtually every place outside. When reaching the house foundation they start up the walls. If they reach the basement windows first, that is where they enter. If there is no basement, they will crawl under or go up the outside walls where the windows become the first and main place of entrance. Sometimes the doors or other wall openings become their first place of attack. Arriving at the window or door jambs, most of the mites seem to go back into the building walls. However some walk around the window jamb and onto the inside window sill, and in many cases, throughout the house. The mites that miss the doors and windows keep crawling and may enter at the first wall break such as the roof level, and there enter the house walls. Once inside the house walls, the mites lay there if the weather is cold. On the sunny side of the house on warm days, these mites work out onto the window sill, and resume their constant crawling everywhere inside the house.

TICKS-OFF WILL STOP THEM with 100% effectiveness wherever it is properly sprayed. It is the **ONLY ANSWER** that has proved satisfactory for immediate and continued protection.

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TICKS-OFF does what no other *safe* repellent or insecticide can do. TICKS-OFF, when used as directed, gives *complete*, not partial, protection against clover mites.

Order Today!

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10 Dozen or More..... 9.99 Per Doz.

Prices Include Prepaid Transportation

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Fig. 1 (top). Operator demonstrates proper application method to give bins and flat storage protective treatment from insect infestation by evenly spreading calculated amount of Pyrenone Wheat Protectant over surface of a truck load of wheat. **Fig. 2** (second from top). Here the Protectant is cut into the first two or three inches of the wheat's surface to hold it in place. **Fig. 3** (third from top). A load of surface treated wheat is dropped into an auger hopper. When the wheat is hauled and dumped at the foot of a conveyor, the spiral action of the auger will insure an even mixture of the Protectant with the wheat. **Fig. 4** (bottom). Grain growers look on while operator pours Protectant into a mechanical feeding device which evenly meters the desired amount of protective powder into the grain conveyor. Rotative motion of the auger conveyor then mixes insecticide with wheat as the grain is moved into the bin.

How to Protect Stored Wheat from Insect Damage

by

DR. WALTER E. DOVE

Director, Entomological Research, U. S. Industrial Chemicals Co., Baltimore, Md.

ALERT pest control operators are developing new customers because of the government-sponsored grain sanitation program aimed to prevent insect-infested wheat from getting into human food. But it takes "know-how" to get in on this growing demand for service: knowledge of where to find insect trouble spots as well as how to eliminate them. Here are recommendations for both phases of such a control program, along with suggestions for using Pyrenone wheat protectant to prevent future infestations.

• Grain Industry "Ready"

Grain found unsuitable as food for man can only be used as feed for animals, so naturally such wheat brings lower prices. Insects also cause substantial reduction in the weight of stored grain. Even greater loss of the endosperm and embryo, most nutritive portions of the kernel, results from insects. If for no other reasons than these, the grain sanitation program thus has the full support of both millers and growers. They're "ready" to buy a program that will wipe out these costly insect problems.

Four recommended procedures for storing and handling wheat reduce costly damage caused by insects: (1) the clean-up; (2) spraying of bins; (3) treatment of grain with Pyrenone wheat protectant or fumigation, whichever is applicable; and (4) continuous observations for prolonged protection.

• Primary, Secondary Invaders

When called on a job where there is infested grain, first determine types of insects involved, where they occur, and how they work to damage stored grain.

Since grain insects divide their labors and work like armies, they can be divided into two groups—primary invaders and secondary invaders.

Primary invaders such as the rice weevil, granary weevil, Angoumois grain moth and lesser grain borer, develop in the kernels of sound grain. These insects not only destroy grain kernels, they create conditions that favor secondary invaders. This

latter group includes flour beetles and bran bugs—which feed upon frass left by primary invaders as well as on broken particles of grain.

Normally, it takes only a few weeks for a generation of secondary invaders to develop. Grain that is out of condition does not need primary invaders to start the destructive process—the very fact that it is out of condition means it is just right for the development of secondary invaders. If grain is not properly cleaned, cast larval skins, dead insects and excreta remain in the grain and serve to contaminate the cereal as well.

Mites are usually associated with grain that is out of condition or with heating conditions that are brought about by a high moisture content. Heating of grain often results from a build-up of an insect infestation, or its combination with a high degree of moisture. Take temperatures at frequent intervals to detect any "hot spots", so that appropriate measures may be taken to protect the grain.

Another sign of infestation is the appearance of small webs which protect moth larvae on or near the surface of the grain. This generally spells the appearance of Indian meal moths in the granary — insects that require some special control efforts.

• Eliminate Breeding Areas

PCOs can effectively eliminate or reduce insect breeding areas and thus provide less opportunity for insect contamination in newly stored grains and seeds.

In 1952, Professor Donald A. Wilbur and Mr. L. A. Warren, of the Kansas State Agricultural College, made an intensive survey of 115 farms. They found 15 different kinds of grain insects in small accumulations of grain in farm buildings.

Of 296 grain bins selected at random, 73% were discovered to be infested. Wheat bins alone had an infestation of 65.9%.

Waste grain, consisting of seeds or left-over feed, was scattered about in 89% of all feed rooms examined. It lay overhead in the bin, in holes in walls, on the floor, beneath the door, and outside of the door. Spilled grain or feed was outside 47% of the doorways; 44% had grain beneath the floors.

A variety of other places about the farms were potential breeding spots. Of 121 barn mangers examined, 84% had accumulations of feed. Other sites where a large percentage of waste grain was found included barn runways and driveways, garages, tool sheds, hog houses, and even in hay lofts.

These breeding places are grim reminders to carefully search and examine the different kinds of locations that may harbor small amounts of waste grain or feed.

• Clean-Up Storage Sites

Operators should remind grain growers that cleaning storage bins becomes necessary about one month before harvest. A careful examination for possible infestation comes first, though. Then the bin should be completely cleared of waste grain, cobwebs and dust around the rafters, and debris on floors and walls, paying particular attention to material that might have slipped into cracks and crevices. Remove and burn such accumulations in order to kill any insects that may be present.

Move chicken feed, dog feed, seed grains, and similar products away from the granary and keep in tightly closed drums. Turn old used bags inside out to remove any waste grain and then also store in a drum. After the clean-up is finished, continue the search around the farm so any additional breeding places may be eliminated.

• Spray Bins Before Harvest

Spray grain bins about three or four weeks before harvest. U.S. Department of Agriculture Leaflet No. 345 recommends that a spray containing either 2.5% DDT, Methoxychlor, or TDE, or one containing 0.5% pyrethrins or allethrin be used as a residual type spray on walls, floors, ceilings, and partition boards of bins at the rate of two gallons to 1,000 square feet.

It also suggests synergized sprays of pyrethrins or allethrin in quantities to make them equal to a 0.5% emulsion.

Such sprays kill insects on contact, and provide additional residual protection for any insects that may later come in touch with treated surfaces. A spray extensively used for this purpose, that offers no hazards of toxicity, is Emulsifiable Pyrenone 10-1. It is diluted with nine equal volumes of water and sprayed onto all surfaces the grain might touch. Like the other sprays, it is applied as a coarse spray almost to the point where it will run from the surface. This usually requires about one gallon of diluted spray for 750 square feet of wood surface, and slightly more for concrete or brick walls. Trucks and boxcars used

Insect damage to grain is dramatically shown by these three jars of wheat infested with the granary weevil. Note extent of shrinkage at end of 96 days, leaving a matted and caked mass with moisture and mold. (Photo courtesy of Dow Chemical Co.)

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Fogging river from bridge

Fogging operation in wooded area

Applying insecticide to catch basin with motorcycle spray unit

Photographs courtesy of Desplaines River Mosquito Abatement Authority, Chicago Tribune, Chicago Sun.

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FULLY PORTABLE Filled with fuel and insecticide and ready to go, SWINGFOG* weighs only 33 lbs. Shoulder carrying strap makes it even easier to carry for protracted periods.

OPERATES VERTICALLY — Unique tank design enables operation pointed straight up or down at 45°.

TAKES BOTH OIL AND WATER FORMULATIONS - SWINGFOG* works equally well with oil or water base insecticide formulations.

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SAFE FUEL INJECTION — Fuel injected directly into combustion chamber. Eliminates danger of back flash in exposed areas.

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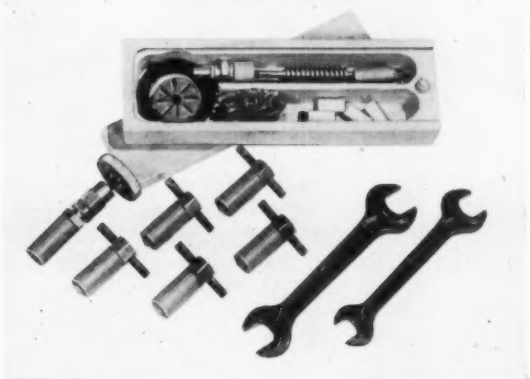

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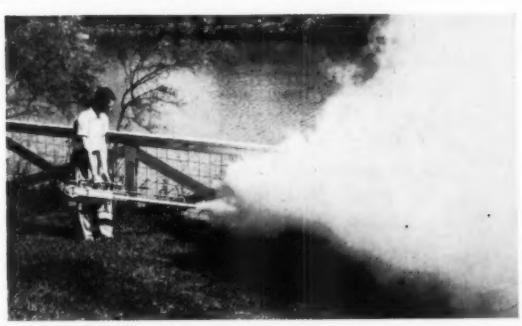

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for conveying grain should receive similar treatment.

About two weeks after the bin has been sprayed, it should be dry and in proper condition for receiving new grain. But before the grain is put into it, a light application of Pyrenone Wheat Protectant to the surface of the floor is recommended. This provides an additional barrier against insects that may come through crevices in the floor.

• How to Determine Grain Moisture

Advise customers that someone loses money when newly combined wheat contains as much as 14% moisture in a sample of wheat. Local managers of grain elevators can quickly determine the percentage, but there is a simple method the PCO or grower can use which involves the use of ordinary table salt. Just take a half pint container, fill it half full with newly threshed grain, add one half teaspoonful of dry table salt, replace the cover and shake for a couple of minutes. Then empty the grain onto a smooth, dry surface. If the salt particles clump together, it means that there is still too much moisture in the grain and it should be harvested at a later date. Best time to harvest and store wheat is when the moisture content is below 13%.

• 3 Ways to Compute Volumes

Know how to compute grain volumes in storage bins in order to calculate the number of bushels to be treated. Here are several easy methods for doing this:

For a square bin multiply the length by the width by the depth of the grain (all in feet) by 0.8. This gives the number of bushels for small grains.

For a round bin or crib, multiply the diameter by itself then by the depth of the grain (all in feet). This figure should then be multiplied by 0.63 to get the capacity of the bin in bushels.

The number of bushels of bulk grain on a truck or wagon that needs treatment can be determined if you multiply the length by the breadth by the depth (all in inches) and divide the number by 2150.

• Pyrenones Recommended

One of the most effective ways to treat stored wheat is to use Pyrenone Wheat Protectant. The recommended rate of application is 75 pounds per 1,000 bushels of grain, which means 7½ pounds for each 100 bushels. If suitable scales are not convenient for weighing, use a quart measure which holds 1½ pounds of Protectant. Five quarts of Protectant weigh 7½ pounds—the correct amount for treating 100 bushels of wheat. Pyrenone Wheat Protectant is made with pulverized wheat so that it does not affect the appearance or feel of the grain and consequently there is no effect upon grading. It is not recommended for grain other than wheat.

Comparison of Grain Fumigants and Pyrenones

Use Consideration	From Fumigants	From Pyrenone Wheat Protectant
Prolonged protection	Unsatisfactory	Satisfactory
Repellency to insects	Unsatisfactory	Satisfactory
Ideally tight storage	Satisfactory	Satisfactory
Fairly tight storage	Satisfactory with increased dosages	Satisfactory
Poor Construction	Impossible	Satisfactory
Clean grain	Not needed	Time to apply **
Weevily grain	Urgently necessary	Use after grain is fumigated
Hazards in application	Precautions needed	Satisfactory
Flavor affected	Satisfactory	Satisfactory
Grading affected	Satisfactory	Satisfactory
Total	4 Satisfactory	9 Satisfactory

** Prevent insects from getting into the grain.

• Fumigants vs. Pyrenones

Since Pyrenones do not penetrate kernels of grain like a fumigant, they do not kill immature stages of insects within the kernels, therefore weevily-grade wheat should be fumigated properly before it is treated with Pyrenone Wheat Protectant. A fumigant is used for killing an existing or concealed infestation of immature stages. Pyrenone is applied to obtain a prolonged protection of the grain against insect infestations, preferably before the grain becomes infested.

Because each treatment is used for a specific purpose, know the advantages of each. A comparison of benefits from both Pyrenone Wheat Protectants and regular grain fumigants is shown in the table above.

• Bin or Flat-Storage Treatment

PCOs can apply Pyrenone Wheat Protectant by one of several different methods. The primary objective is to obtain a uniform coverage plus an extra layer on the floor and on top of the grain.

To give bins or flat storage protective treatment, figure the correct amount of Pyrenone Wheat Protectant needed for a load of wheat, according to the methods described earlier, and apply the Pyrenone fairly evenly to the surface of a loaded truck. (Figure 1) Then cut the treatment into the surface of the wheat with a shovel to hold it in place (Figure 2).

When the load is hauled and dumped at the foot of a conveyor, the spiral action of the auger will insure an even mixture of the Protectant with the wheat (Figure 3). If the auger is fitted with a cleaning screen, remove it, because a screen is not needed on newly harvested wheat. When wheat really needs cleaning, introduce the Protectant just above the screen so it will not be removed as the grain goes over the screen.

In case wheat is simply shoveled or allowed to flow into a bin, stop the process every three or four inches of grain and apply a layer of Pyrenone by hand or with a dust gun. A garden rake can be moved over the wheat surface to insure good mixing of the protectant with the grain.

Operators will find Pyrenone Wheat Protectant is easy to apply to a stream of grain as it is being stored in bins. Simply determine the amount of Protectant needed for grain to be treated, and apply a light coverage to the bottom of the bin. As the bin is being filled, proportionately feed the Protectant by hand into the stream or auger. Add a double rate of application to the last three inches of top surface as an added protection against incoming insects.

(Continued on page 60)

DOW

From any angle . . . PCO's rate

Dow Methyl Bromide

tops for fumigation of food processing plants and storages

For quick, thorough pest control in mills, food plants and storage warehouses . . . Dow Methyl Bromide is your best bet from *any* angle. *From a bug's point of view*—Dow Methyl Bromide means the party's over for pests feeding in bulk and packaged commodities! This foremost food fumigant possesses such remarkable *penetrating power* that it reaches many hiding places inaccessible to other fumigants and controls insects (including larvae) and rodents.

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Spray Unit

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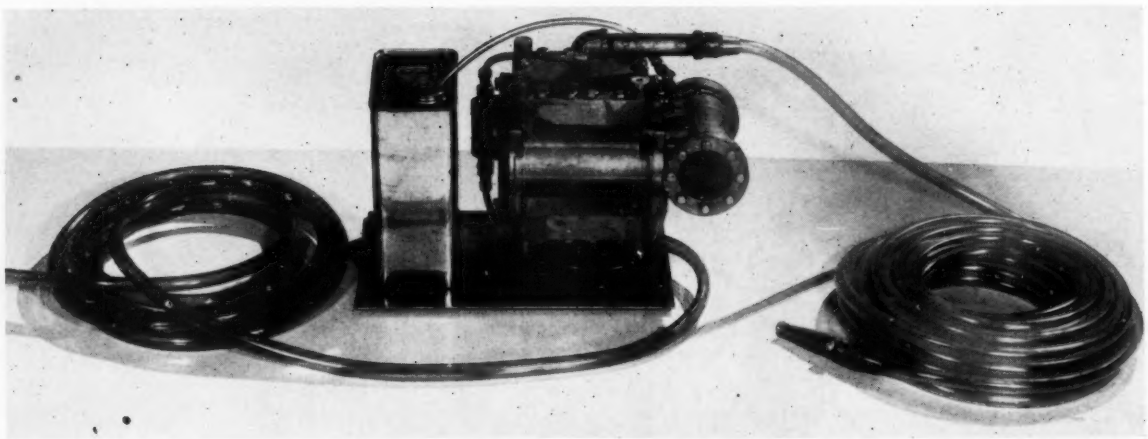

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- **Dimensions 12½" High 18½" Long 9" Wide**
- **Any Emulsifiable Insecticide Concentrate May Be Used**
- **Costs Nothing To Operate As It Uses The Power And Water From Always Present Water Faucet**
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HOW YOU PROFIT: The Hyromotor Unit eliminates the use of trailer and trucks. The compact, extremely portable unit can be transported from job to job in seat of car next to driver. Besides cutting spraying time in half, the unique principle of the Hydromotor saves you additional time by making it possible to spray thousands of gallons of material without ever stopping to refill or empty tank. It eliminates laying hoses over sidewalk, thereby preventing possible injuries. Hyromotor even makes the small spray jobs profitable.

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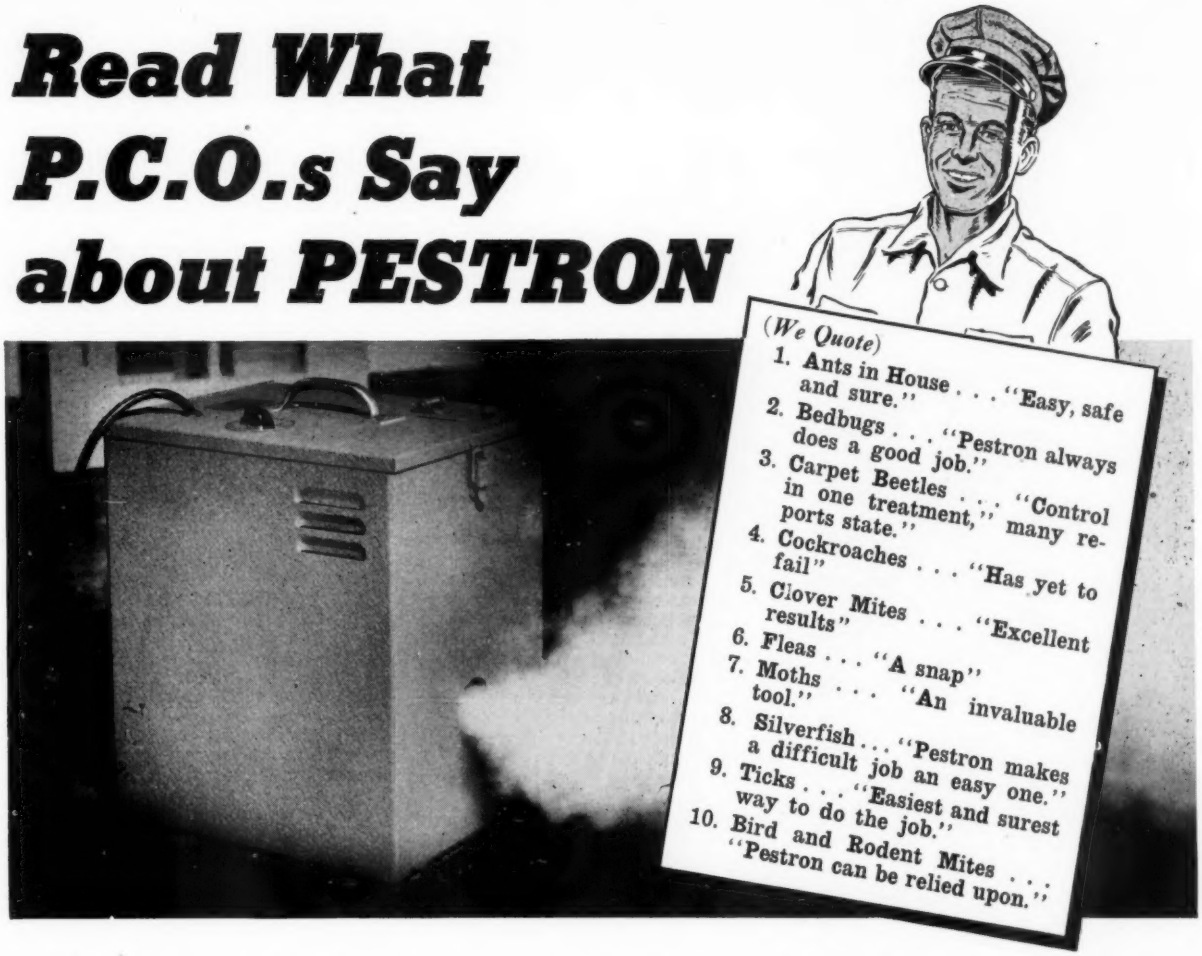

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patents

RELATING TO PEST CONTROL

By Dr. R. C. Roark
U. S. Department of Agriculture

Copies of all patents can be obtained for 25 cents (no postage) sent to the Patent Office, Washington, D. C. In ordering a copy of a patent the number of the patent, the date, the name of the patentee, and the subject of the invention should be stated.

2,654,178 (Oct. 6, 1953; app. Dec. 21, 1944). **CHEMICAL GUN TRAP.** Hershey Roy Graybill, Manheim, Pa.—American Trap Company of America, Lititz, Pa.

2,654,677 (Oct. 6, 1953; app. Dec. 1, 1950). **MOTHPROOFING AGENT AND MATERIAL CONTAINING THE SAME.** Ida Marie Rasmussen, New Brunswick, and Edward F. Rogers, Middletown, N. J.—Merck & Co., Inc., Rahway, N. J. An organic material susceptible to attack by textile insect pests has incorporated therein a compound selected from the group consisting of bis(p-chlorobenzene-sulfonyl)-methylene diamine and bis (p-bromobenzene - sulfonyl)-methylene diamine.

2,655,405 (Oct. 13, 1953; app. Oct. 19, 1949). **MOBILE SPRAYING EQUIPMENT.** Emert J. Lattner, Cedar Rapids, Iowa.

2,655,513 (Oct. 13, 1953; app. July 5, 1952). **PESTICIDAL COMPOUNDS.** Morton Kleiman, Chicago, Ill.—Arvey Corporation. This invention relates to a group of compounds characterized in part by their having a partially hydrogenated naphthalene structure with the 1,4 and 5,8 carbon atoms thereof being bridged respectively by an endomethano group and an oxygen bridge, and further characterized by being hexahalogenated in fixed and known positions. The compounds of the present invention are, therefore, hexahalo-1,4-methano- 5,8- oxahexahydronaphthalenes.

2,655,514 (Oct. 13, 1953; app. July 5, 1952). **PESTICIDAL COMPOUNDS.** Morton Kleiman, Chicago, Ill.—Arvey Corporation. The compounds of the present invention are hexahalo-1, 4-methano- 5,8-oxa-6,7-epoxy-octahydronaphthalenes.

2,655,535 (Oct. 13, 1953; app. Nov. 23, 1949). **ROCOVERY OF CHLORTETRACYCLINE.** Charles Pidacks, Spring Valley, and Edward E. Starbird, Nanuet, New York—American Cyanamid Company, New York,N.Y.

2,655,759 (Oct. 20, 1953; app. June 26, 1950). **ANIMAL TRAP.** Lothar C. Cronberger, Tulsa, Okla.

2,656,217 (Oct. 20, 1953; app. Jan. 31, 1951). **LOW-PRESSURE SPRAY GUN.** Andre Roche, Aix-en-Provence, France.

2,656,641 (Oct. 27, 1953; app. Nov. 14, 1949). **VERMIN TRAP.** George Francis John Dandridge, Loughton, England. This invention is designed for use in trapping mice.

2,657,166 (Oct. 27, 1953; app. Oct. 7, 1950). **CHLORINATED TERPENE ALCOHOLS, ESTERS, AND ETHERS AS INSECTICIDES.** William D. Stonecipher, Newark, Del. — Hercules Powder Company, Wilmington, Del. An insecticidal composition comprises the product of chlorination in an inert solvent with chlorine gas in the presence of a free radical-forming chlorination catalyst at a temperature in the range of about 50° C. to about 150° C. to a chlorine content of about 40-70% of an oxyterpene material of the group consisting of isobornyl acetate, isobornyl chloroacetate, isobornyl propionate, bornyl salicylate, fenchyl alcohol, isoborneol and terpinyl chloroethyl ether and an insecticidal adjuvant as a carrier therefor.

2,657,167 (Oct. 27, 1953; app. Oct. 13, 1950). **CHLORINATED TERPENE DERIVATIVE.** Warren L. Walton, Schenectady, N. Y.—Hercules Powder Company, Wilmington, Del. An insecticidal composition comprises the product of chlorination of a cyclic terpene-polyhalomethane adduct dissolved in an inert solvent with chlorine gas in the presence of a free radical-forming chlorination catalyst at a temperature in the range of 50° to 150° C. and containing from about 54% to about 75% chlorine, said adduct being the product formed by heating a cyclic terpene and a polyhalomethane in the presence of a peroxide catalyst.

2,657,168 (Oct. 27, 1953; app. Oct. 17, 1950). **POLYCHLORO BICYCLO HEPTANES AS INSECTICIDES.** George Allen Buntin, Wilmington, Del. — Hercules Powder Company, Wilmington, Del. An insecticidal composition comprises a polychlorobicyclo[2.2.1]heptane containing 55-75% by weight of chemically combined chlorine and an insecticidal adjuvant as a carrier therefor, said polychlorobicyclo [2.2.1] heptane being the product obtained by chlorinating 2-methylbicyclo[2.2.1]-5-heptene dissolved in an inert solvent with chlorine gas in the presence of a free radical-forming chlorination catalyst at a temperature in the range of about 0-150° C.

2,658,017 (Nov. 3, 1953; appl. Nov. 26, 1948). **INSECTICIDAL COMPOSITIONS CONTAINING 1,2-DICHLORO-4 (alpha, beta-DICHLOROETHYL) - CYCLOHEXANE AND METHOD OF USING THE SAME.** Edwin G. Marhofer, Fredonia, Kansas.—Phillips Petroleum Co. — This invention provides a hydrocarbon solution of DDT plus 1,2-dichloro-4-(alpha, beta - dichloro - ethyl) - cyclohexane, acting both as a solubilizer for the DDT and as an active insecticidal ingredient.

2,668,993 (Feb. 16, 1954; appl. Aug. 7, 1950). **ELECTRICALLY HEATED VAPORIZER.** Julian H. Bair, Seattle, Wash.—This electrically heated vaporizer is used to vaporize disinfectants.

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MORE KILL
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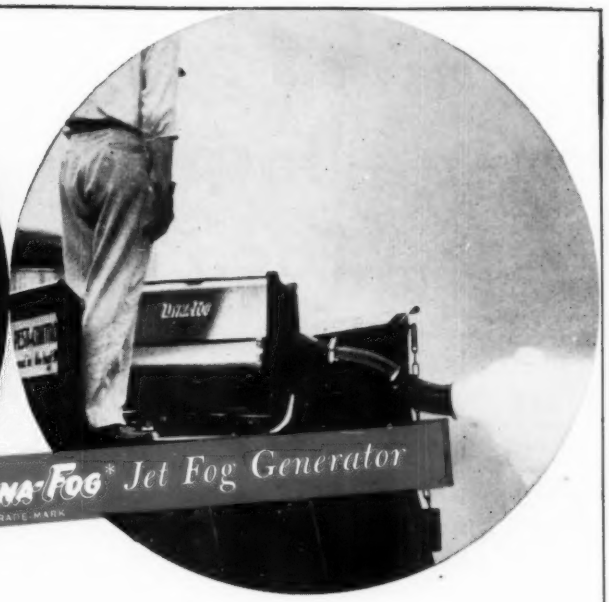

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Length—62″ from front to end of exhaust outlet. Width—12″ across top bars. Height—24″.

More Kill—The Dyna-Fog* delivers more kill per formulate dollar.

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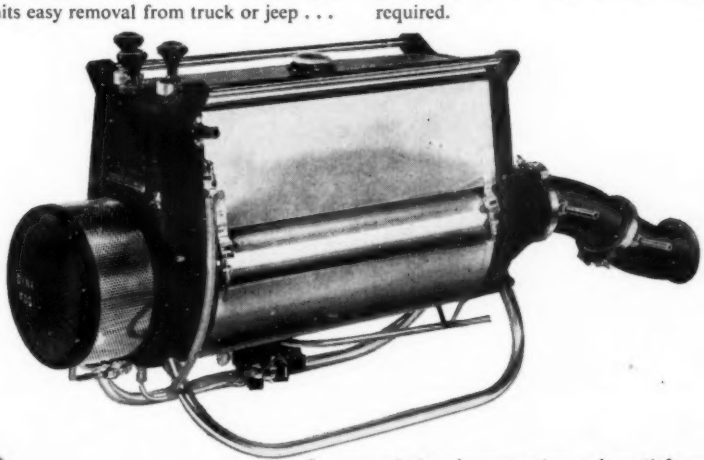

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Here's the Way to Inspect A Food Plant

by

J. HARVEY STURGEON

Sturgeon Pest Control

Louisville, Kentucky

Author Sturgeon emphasizes value of written reports in this timely article on food plant inspections.

LUKEWARM food plant prospects can be turned into profitable customers if you offer a written sanitation survey along with regular pest control service. Besides, you can crystallize what needs to be done and eliminate wasted service hours by inspecting the plant before digging in to work.

A survey has a double-barreled benefit to both you and management at the food plant. Notes you take spotlight the trouble, show the customer what has to be done, and gets him to understand why his cooperation is necessary. The written survey also lays out your plan of attack.

And here's a tip.

Get plant officials to accompany you during the initial inspection tour. When they see infestations and causes of trouble first-hand, the battle to enlist their cooperation is more than half won. This PCO-management teamwork is necessary anyway if adequate sanitation practices are to be carried out.

But now let's see what a food plant inspection involves.

• First Check the Outside

Begin your survey outside the plant. Pay particular attention to insanitary conditions and possible means of entry by insects and rodents. Both often pinpoint the reasons for trouble inside.

Don't trust anything to memory! Take notes.

Is there weed growth, stacked lumber, loose pipes, scrap iron, or discarded equipment? They should be eliminated. Make a note of where they're to be found. What about grain doors, railroad sidings, and loading docks? Is their condition too tempting for rats and mice? Spillage of feed and food products has to be cleaned up. Write it down.

Be sure to spot eaves, high windows and the condition of the garbage disposal area. Examine the first two for sources of bat infestation. Does the plant have sanitary garbage disposal? If not, jot it down. Your control program may be in vain if this is not corrected. This kind of negligence is more dramatically called to management's attention if they're along on the initial inspection.

Now let's get a little closer to the building itself. Check for shallow walls, open cracks in the foundation, missing bricks, loose-fitting doors, holes, spaces around in-going pipes, and heavy growth — bushes, high weeds, etc. — close to the structure. Insects and rodents can use any of these in their attack on the tasty morsels inside. Write in your survey those spots that have to be corrected.

• Examine Roof Exhausts

Dust collectors and vents that exhaust on the roof often are infested with insects that soon find their way inside. They're ideal nesting places for mite-carrying birds, too. Yes, you've got to use a ladder to make a general inspection of the roof area, both inside and out, if your written survey is to be complete.

• Inspect Incoming Goods

Next you go over the inside with a fine-tooth comb. Inspect incoming supplies to see if they're infested before they ever get into the plant. That's often an obvious cause of trouble food plant officials overlook. But, whether or not you find signs of infestation in goods moving into the plant, recommend all shipments be carefully examined for insects and rodents before they're put in the warehouse.

Take a look around. Is the building itself sanitary? The pure and simple fact is the warehouse and manufacturing rooms must be kept clean with materials stacked properly. If this cannot be done, management can expect nothing more than a minimum reduction of their pest-contamination headaches. Foodstuffs resting on the floor make excellent breeding places for rats, mice, and all kinds of insects. Platform storage not only looks better, makes pest control and inspection easier, but also goes a long way towards wiping out infestations.

Next, hunt out discarded equipment stored inside. If you spot it, note its location and urge it be removed. These dead-weight dust collectors make uninhibited homes for disease-bearing pests that bring costly decisions from Food & Drug Administration inspectors.

Inspect overhead pipes and rafters for heavy layers of dust. If you are not equipped to vacuum these clean, get company personnel to do it.

The ingenious, involved, Rube-Goldberg machinery usually found in food processing plants is one of the most important sources of infestation. Everyday operation of these complicated devices decreases their original tolerances and loosens parts originally meant to confine foodstuffs

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B & G C-100 Termite Drilling Unit

Drills
3 Inches
of
Solid Concrete
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The light, rugged, easy-to-use C-100 uses a jack hammer that weighs only 14 pounds and is automatically self-rotating. Two carbide tipped steel drills with the adapter to fit hammer are included. Each drill is 12" long with a ¾" diameter and will average 2,000 feet of concrete drilling each . . . and do a neat job without chipping adjacent concrete. Also included are 2 fifty foot lengths of braid and a 1-inch wear-resistant air hose with snap-on couplers.

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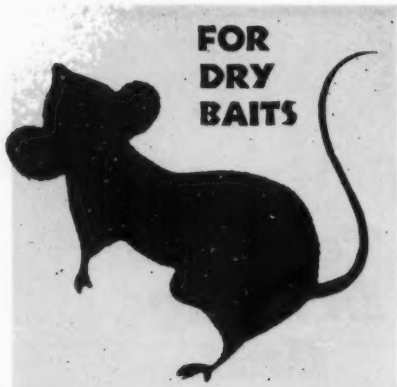

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Resistance to insect infestation — extensive laboratory tests of Pival's insecticidal action have demonstrated that, even under conditions of severe exposure, specially prepared Pival cereal baits are far less subject to insect infestation — an important plus in bait storage and in use.

Resistance to mold contamination— during large scale field application in both Louisiana and the Philippines, permanent bait stations exposed during the heat and humidity of full Summer remained completely free of mold. Laboratory tests prove the delaying action of Pival to mold contamination in cereal baits — another important plus to permanent baiting programs.

It is easy to see why large scale field usage has shown an unusually high degree of successful application of Pival cereal baits in the control of Norway rats, roof rats and house mice. Reorder now for the coming season.

MOTOMCO, INC.
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going through. Food spillage all along the process line results. The escaping food dust, flakes, and particles are a gourmet's delight for insects and rodents. But machines aren't the only ones that unknowingly leave food around. Workers carelessly discard their lunches, or leave scraps from the noon-day sandwich on the floor. If you find these conditions, write them down.

Proper sanitation education of plant personnel goes a long way towards ending food spillage. Suggest a method for proper sanitation enforcement and disposal of food waste, especially lunch scraps.

One last thing. See that feed is not stored in the process room or next to foods in the warehouse. And, make sure food and feed products are not kept in storage for any length of time. If they are, the food plant is only asking for trouble.

Naturally, your own on-the-spot inspection will uncover other "hot" spots throughout a food plant, but the places I've mentioned are often passed up.

Once you've gone over your written survey, have it neatly typed up to give to your customer.

Putting your plans on paper brings the kind of action plant supervisors like. And why not? Health inspectors look with a more pleasing eye on a food producer that's protecting its product with a careful pest control service.

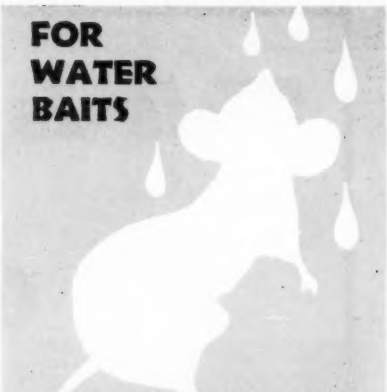
Best of all, the written survey cuts your costs, results in greater profits, and gains for you the respect of your food plant customer who cannot help but recommend your thoroughness to his friends.

Calif. Field Rodents Booklet

"Controlling Field Rodents in California," is a new booklet compiled by Professor Tracy I. Storer, of the University of California.

It deals with the control of such pests as ground squirrels, tree squirrels, pocket gophers, field mice, kangaroo rats, muskrats and rabbits. Restrictive measures discussed by Professor Storer are the use of poisons, trapping, shooting, exclusion, and encouragement of natural enemies.

For copies of this pamphlet write the University of California, College of Agricultural Extension Service, Library-Administration Building, Davis, Calif.



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Pivalyn is the only water soluble anti-coagulant which combines top acceptability, resistance to molding and equal effectiveness in hard and soft water. Used alone in place of the older cereal-type baits, this superior water-soluble anti-coagulant has proven its effectiveness in areas from coast to coast and under widely varying conditions on farms, in homes and in business establishments.

Simple to use, it is packaged for the PCO as a 4.4% concentrate in convenient individual foil packets. One Pivalyn packet to one quart of water—that's all there is to it! As a "taste-treat" for rodents, and under conditions of difficult control, sugar may be added to the Pivalyn solutions.

Pivalyn's exclusive mold-resistant action provides excellent keeping qualities. Even with the sugar added (and laboratory tests have indicated as high as 10 to 1 acceptability over plain water by the addition of two tbsp. of sugar per quart), Pivalyn water baits normally remain mold-free for periods up to eleven weeks.

A worthy companion to Pival — the new and improved rodenticide for use in dry baits — which has proven itself by your reorders, Pivalyn is ready to go to work for you. Packaged for the PCO in units of 100 packets per box.

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Pest Control and PCOs in the Food Industry

Mr. Clark is responsible for seeing pest control in his firm's many plants result in no contamination of food.

by
CHARLES E. CLARK
Coordinator of Sanitation
General Foods Corporation
White Plains, N. Y.

LET'S look at certain phases of pest control as experienced in the food processing industry. What I say may or may not apply in other situations.

• Rat Control

The materials, equipment, and knowledge or "know how", to successfully control rats, are all available. Ingredients necessary for complete control are: properly trained people, the will, time, and money to do the job. Essentials of rat control around food processing plants include the following:

1. Appreciation of the importance of population dynamics.
2. Perimeter control.
3. Rat proofing of buildings.
4. Trapping.

Dr. David Davis and others have studied various phases of rat population dynamics. We all know that basically the rat population of an area depends on the amount of food and shelter available and that popultion fluctuates up or down with changes in these necessary components of successful living. All of which means; the more food and shelter the more rats; the less food and shelter the fewer rats.

Environmental conditions do not stay static. More food is available in the summer than during the winter, resulting in a seasonal cycle. Available shelter likewise is continually changing.

As these inter-related factors change, potential rat populations must change with them. When the food or shelter, or both, are reduced, the well fed, well sheltered rat must move or perish. If the rat population is at the maximum numbers the environment can accommodate, there will be migration. Rats being rats, and nature being what it is, new litters will be produced constantly and either the old or the young or some of both, must migrate to survive. All this adds up to a fluctuating but nevertheless constant pressure on rats to invade unoccupied premises, in our case food plants.

• First Line of Defense

In the war on rats we need to establish a series of lines of defense. This concept was first developed by the Fish and Wildlife Service following successful tests at a mid-west food processing plant. I do not believe the concept of **perimeter control**, or the first line of defense, has been fully appreciated or understood. It certainly has not been used to the fullest extent. As an example of misunderstanding, I saw recently where the term perimeter control was being applied to a trap line established **inside** a building. Perhaps we need a definition for perimeter control. Here is mine for what it may be worth:

> 'Perimeter control consists of the various measures taken to prevent the penetration of rodents through a defense line established outside around the premises to be protected. This line may be established anywhere between the foundation wall and a distance of 100 yards therefrom". (The 100 yard limitation is, of course, an arbitrary figure but a practical one.)

In my opinion, this first line of defense, or perimeter control should consist of bait boxes continuously supplied with adequate quantities of an anticoagulant type bait. Water should also be available at the feeding stations during non-freezing weather.

The number and placement of stations will depend on the size and location of the plant and the surroundings which make up what has been called the "avenues of access." It could be a row of accessory buildings, railway sidings, a drainage ditch, a row of shrubbery or other things which provide some degree of shelter or concealment along an approach route.

The services of a reliable pest control operator will be required to set up and maintain this defense system if no trained man is available from the company organization.

We prefer to limit the bait in these outside boxes to the anticoagulant type because of their comparative safety. If these bait boxes are sufficient in number, well placed and properly serviced, the number of rats getting through this first line of defense should be small.

• Second Line of Defense

The second line of defense to keep rats out of a plant is the foundation wall. I am now, of course, considering only the Norway rat. This second line of defense must be the "last ditch" effort. The motto must be: "They shall not pass." Rodent proofing at the foundation line must be complete, frequently inspected and constantly maintained. Here again a competent PCO is needed if plant personnel is inadequate.

We have two plants, each of considerable size, each handling a different type of product very attractive to rats, in which we have not used **any** rodent poison for two years and in which, to my knowledge, no rat or signs of a rat have been seen. These plants

Talk given at Eastern PCO Conference, Amherst, Mass., February 2, 1954.

have perimeter control and rodent proofing as described previously.

• Last Step

If the two lines of defense are effective, it will be a rare experience to see a rat inside the plant. However, it can happen. While visiting one plant, I saw a rat dash from a newly opened freight car across the loading platform and into the plant. So a final step is necessary in a complete program of rat control. This is trapping within the plant building itself. The ordinary snap trap is preferred. We use mostly solid type baits but are testing snap traps with liquid baits. We also use enlarged trigger traps which at long last are available commercially. Trapping is usually successful in catching the casual invader. This method entirely eliminates the odor problem.

• Mouse Control

The procedure for rat control will also control mice to a large extent. When rat proofing a building always mouse proof it at the same time. Essentially, this means closing all small holes, as well as large ones, and the use of quarter inch mesh wire over all foundation windows, or other necessary openings. Mice are much more of a problem than rats in a food plant. To paraphrase a current safety slogan, "The mice you have may be your own." This is almost surely the case, if you have many of them.

We have a new standard for mouse control. Nothing less than complete elimination will be satisfactory. It is difficult to achieve and requires considerable and continuous effort but we believe it is a practical goal.

• Prefers Snap Traps

In our experience anticoagulant type baits have not proved satisfactory for mouse control in food plants. We can no longer tolerate even a low level mouse population. Anticoagulant type poisons rarely, if ever, result in the complete elimination of mice in a large food plant. The action is too slow. Mice are very commonly brought into a plant with incoming shipments. We cannot wait the necessary two to four weeks for the anticoagulants to do their work.

We are resorting more and more back to ordinary snap traps. They are proving very effective providing many closely spaced traps and a variety of baits are used. Of course, good storage and sanitary practices are essential.

• Insect Control

In most modern food plants with an adequate sanitation program, cockroaches have been eliminated. General Foods has not had a continuous infestation in any of its 60 or more plants for four or five years. Of course, new invasions do occur from time to time. Prompt action with residual type insecticides has always proven effective. We have seen no sign of cockroach resistance to insecticides as yet. We are aware of the development of resistance in certain areas and are on the alert. Perhaps we will have this problem in the near future.

Local outbreaks of other kinds of insects occur from time to time but these are usually detected promptly and quickly eliminated. Pest control operators may be called in on such problems, if the food processing concern does not have the services of a trained entomologist. You should have little difficulty with most problems of this type.

One insect problem which is not fully solved to the satisfaction of those in the food processing industry is fly control. A few years ago we all thought we had this one licked, but we were wrong. The swing is back to sanitation, and this is still the basic solution. Insecticides, including pyrethrum type materials, are emergency materials, necessary only where sanitation is not what it should be. Of course, I realize that flies will be with us for a long time to come. So will PCOs and for the same reason!

• Bird Control

The control of birds, especially pigeons, is becoming more and more important, partly because of increased attention to contamination from this source. Also the elimination of rats tends to increase the bird problem, especially around plants handling grain. There is always some spillage and, if rats do not clean it up, birds will. This is **not** an argument in favor of rats!

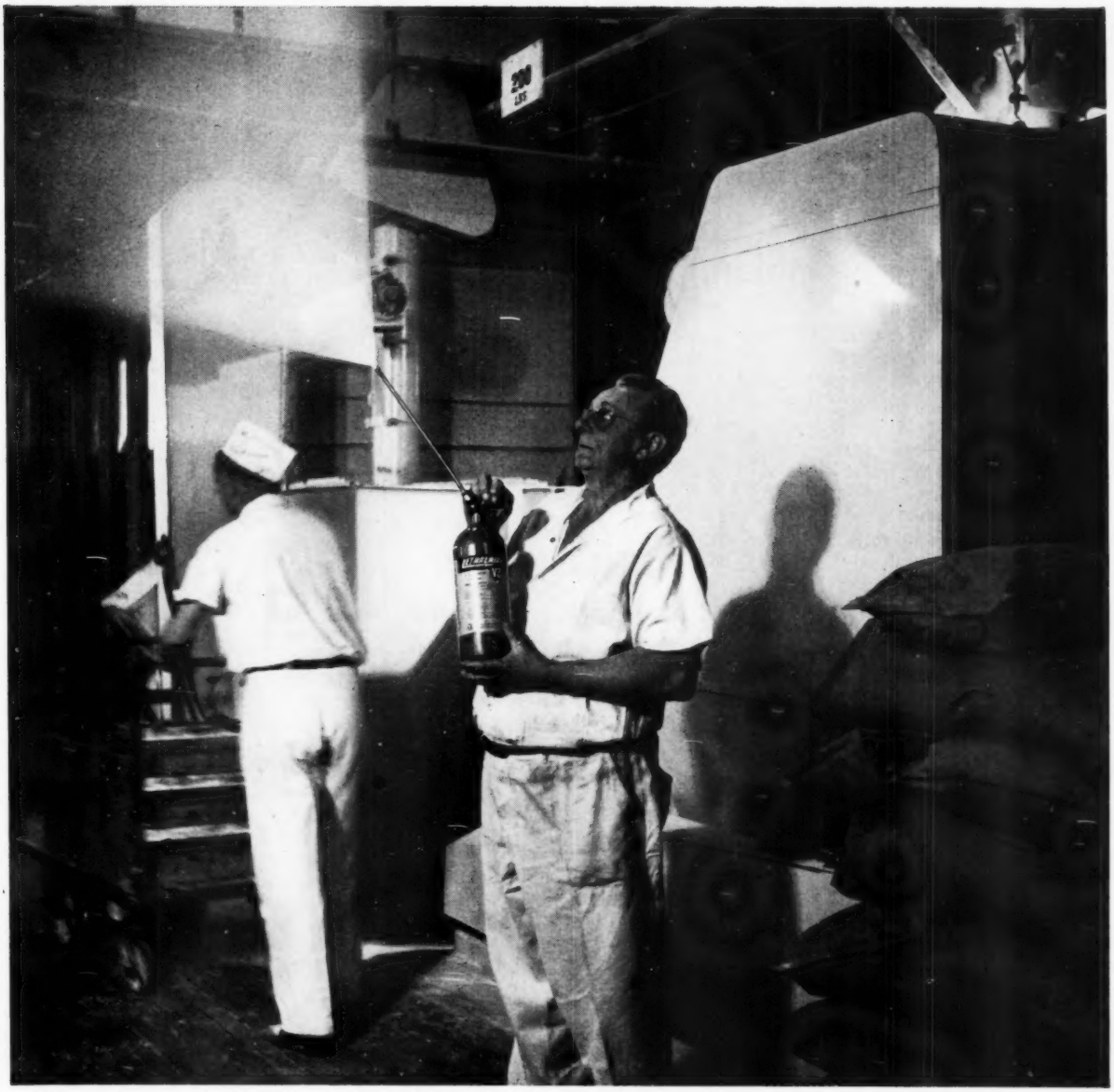
Live trapping is the recommended method for bird control, since it permits the release of protected species of song birds, if present. It is important to give due consideration to local public relations in any bird control program. This tends to exclude other methods of bird control which might be more effective and quicker.

This mention of public relations leads right into my last topic.

Pest Controllers: I use that phrase because I have in mind certain aspects of public relations. I know this subject is of

(Continued on page 61)

"Harold . . . Which is more important—the Angoumois grain moth—or me?"



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If you want a proved fly bomb for your own use, you couldn't make a better choice than Lethalaire® V-21. It's sure death to even the resistant varieties of the pesky critters.

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V-21 is perfectly safe to use wherever food products are processed or handled—it contains no DDT and has been approved by U.S.D.A. Thus it opens up dozens of new prospects for you. Not only bakeries, but restaurants, hotels, institutions, canneries, frozen food processors, etc.—the list is endless.

These are also good reasons why Lethalaire V-21 makes an excellent bomb for you to sell—for use wherever sanitation must be steadily maintained. Many pest control operators the country over are now selling V-21 profitably.

The sale of a Lethalaire bomb has often opened the way to a profitable service contract.

For full details, write **Lethalaire Division, VIRGINIA SMELTING Co., Dept. PC, West Norfolk, Va.**

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VIRGINIA Chemicals

Available in Canada and many other countries

Dr. Gunderson says potential in grain elevators is terrific.

You're Sitting

on a

Gold Mine!

by

DR. HAROLD GUNDERSON

Extension Entomologist
Iowa State College

AFTER several years of careful study on sources of insect and rodent contamination in food grains, the U. S. Food and Drug Administration announced its enforcement program concerning elevators a little more than a year ago.

This was a logical continuation of its work with bakeries and flour mills which had been in progress for several years. These groups were cooperating to clean up food grains, flour, and bread. But grain coming to flour mills was contaminated and food made from such grain was also contaminated.

Surveys showed that some of the contamination occurred on the farm. Until such grain is sold into interstate commerce, the Food and Drug Administration has no jurisdiction over it. And by that time the farmer is no longer the owner. Ownership now lies in an elevator or grain dealer.

These surveys also showed that some of the contamination occurred in the elevator.

So FDA announced its program of inspection and seizure of contaminated grain and prosecution of elevators shipping that grain.

Intent of the program was to interest grain elevators in being more careful about inspecting before purchasing the grain they buy and in cleaning up their own elevators. In that way, farmers would find it worthwhile to clean up insect and rodent pests causing contamination on farms. In order to sell their grain, elevators would clean up their facilities and the objective of the program would be accomplished.

But objections were raised, so the program has not been carried out as vigorously as originally intended.

Let's see what **has** been accomplished in elevator sanitation in one state since the first announcement of the FDA program a year ago.

This paper was presented at the 1953 NPCA convention.

• 8400 U. S. Elevators

These figures were obtained from a survey of Iowa elevators. First of all, how many elevators are there in Iowa? The best figures I can get indicate that we have 752 in the state. In the United States there are about 8400.

Second, what is the capacity of these elevators? It ranges from 5000 to 500,000 bushels. The tota capacity of Iowa elevators is 74.5 million bushels.

• Vast PCO Potential

Here is a vast potential of pest control business for the interested pest control operator. What percentage of elevators use a professional pest control service? The survey shows that 54% of Iowa elevators use PCOs, 8% do their own work, and 38% of Iowa elevators still don't do **any** pest control, apparently.

How long have elevators had pest control service? I think that the answer indicates some effective educational work by all agencies, including the Grain Dealers Associations. Six per cent of the elevators have had PCOs working for them for more than five years. Twenty-five per cent have had the service for five years, 32% have had it for 2-5 years, and **36% have taken PCO service within the last year.**

So you pest control operators have been getting some business —but there's more business still to get. Thirty-eight per cent of Iowa elevators need professional pest control work and I imagine that other grain producing states are in the same boat. This business isn't going to fall into your laps. "You have to make calls if you want to get results."

What are the jobs PCOs do for elevators?

No. 1 is rodent control—all of the elevators using PCOs have that.

No. 2 is bird control—14%.

No. 3 is elevator fumigation and residual bin spraying — eight per cent each.

No. 4 is grain fumigation — which is logical. Infested grain has to be fumigated **today** and the PCO can't get there until next week. But six per cent of elevators have this job done by PCOs.

In the last place is elevator cleaning. Only five percent of the elevators have PCOs do this job. Several elevator operators have indicated that they would like to have such a service.

• Knock On Every Door

Again, the business isn't going to trample you in the rush. We have evidence the way to get that business is to go from elevator to elevator with a cleaning and spraying outfit.

We have made progress in the tremendous job of grain sanitation. But the goal won't be reached until every producer, every dealer, and every processor quits thinking about his own narrow interests and remembers his obligation to the 160 million consumers of cereal foods in the United States.

Your job is important. Every clean elevator is more likely to grade the grain it buys. So go to it — you're sleeping on a gold mine!

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TESTS have proved that Good-rite Strobane in low concentrations kills household pests. Developed by B. F. Goodrich Chemical Company for use in *liquid and aerosol household sprays,* Strobane possesses these advantages: extensively tested for toxicity; no secondary aromatic solvents necessary; pleasant odor; no visible crystalline residue; easy to formulate; excellent stability—will not deteriorate in storage.

For samples and technical information, please write Dept. CJ-4, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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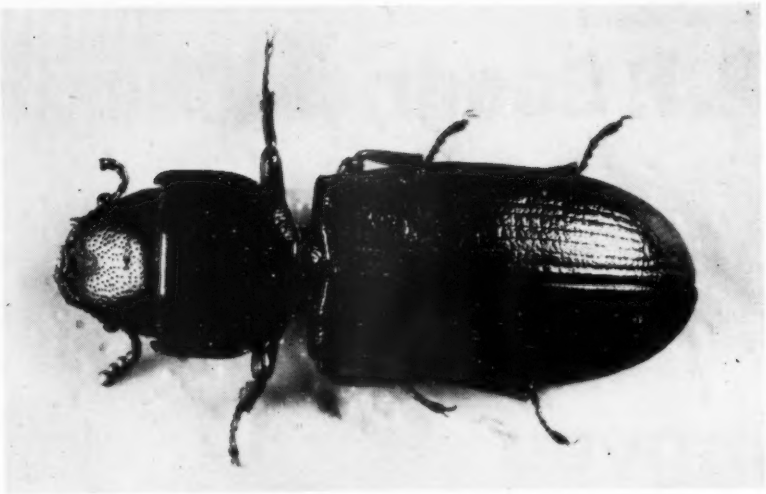
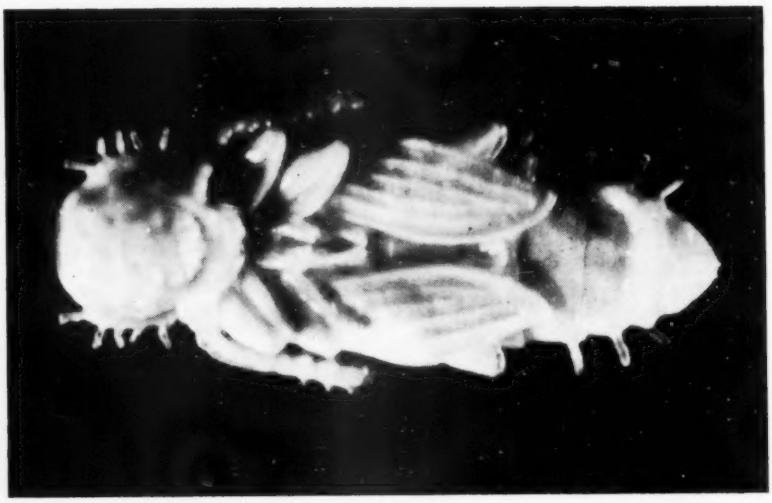
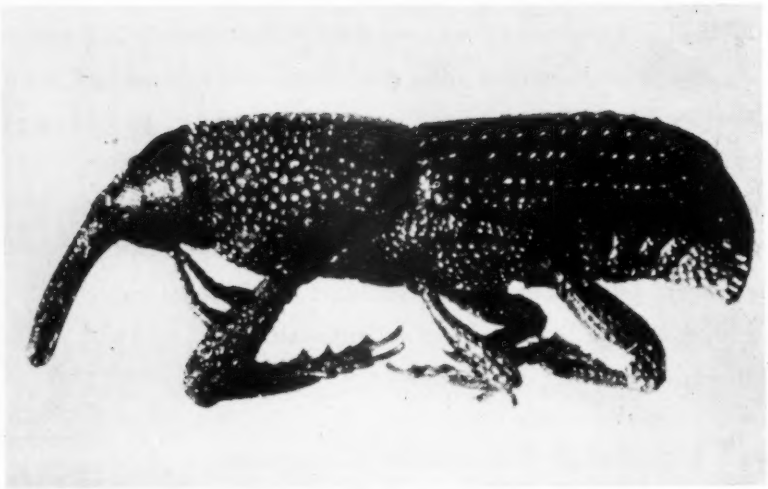
PORTRAITS OF THREE GRAIN PESTS



One of the hungriest members of the animal kingdom is the **Cadelle beetle,** readily identified by the pinched-in waist. Only a half inch long, the female may lay more than a thousand eggs, which in two weeks hatch into ravenous little worm-like larvae. These in turn may spend from two months to three or more years eating grain. To get at it they may chew holes in flour sacks, eat their way through cardboard, and upon occasion eat other insects. By preference these insects eat the softer germ of grain kernels, befouling and destroying much more than they utilize. Adults have been known to bore holes in wood of the storage building and hide there, sometimes for more than a year.



Fumigation with modern vaporizing chemicals can destroy this pupa of a **sawtooth grain beetle.** Scarcely an eighth of an inch long after one to two weeks in this stage the insect pops out of the thin covering skin as a tiny, flattened, dark-colored adult beetle and is ready to mate, lay eggs, and eat more grain.



This **adult granary weevil** and his cousins have been giving farmers and grain dealers a lot of headaches. Granary weevils develop from a tiny, worm-like larva which lives and grows inside a single kernel of grain. The insect is actually about the size of a small grain of rice. Note the long, snout-like face with tiny mouth parts at its tip which is typical of weevils. In proportion to its size this pest eats far more grain than a chicken or horse.

Photos courtesy of Lauhoff Grain Co.

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CYANOGAS® A-Dust is the ideal fumigant for effective and economical control of rats in burrows, in city dumps, sanitary fills, under sidewalks, tight floors and pavements, and along ditch banks and levees. CYANOGAS A-Dust is not a bait . . . it liberates hydrocyanic acid gas in the burrow. Rats, adult and young, that breathe the gas, die quickly. It is best applied with the handy CYANOGAS FOOT PUMP. CYANOGAS A-Dust is ready for instant use, and requires no further preparation. The method of application leaves no dangerous residues to be picked up by children or pets.

CYANOGAS® G-Fumigant is unsurpassed for easy, economical fumigation of small storage buildings (not dwellings) needing only low dosages of gas. CYANOGAS G-Fumigant is a dustless, sea-sand size granulation of calcium cyanide, which liberates hydrocyanic acid gas . . . the same positive fumigant but of lower strength than DISCOIDS.

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AERO* HCN DISCOIDS, Fumigant, the most generally used fumigant in the Pest Control industry, simplifies the job of fumigating dwellings, industrial buildings, railroad cars, ships and stored commodities. AERO HCN DISCOIDS are thin cellulosic discs saturated with commercially pure hydrocyanic acid, and are simply scattered from the can. There is no dirt or mess in application or clean-up. DISCOIDS are especially suitable where insects and rodents are a problem in enclosed spaces.

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Send for full information concerning any or all of these insecticides and rodenticides.

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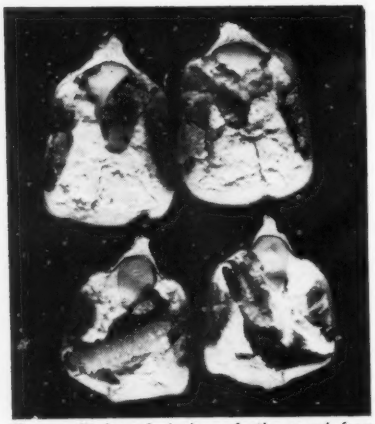
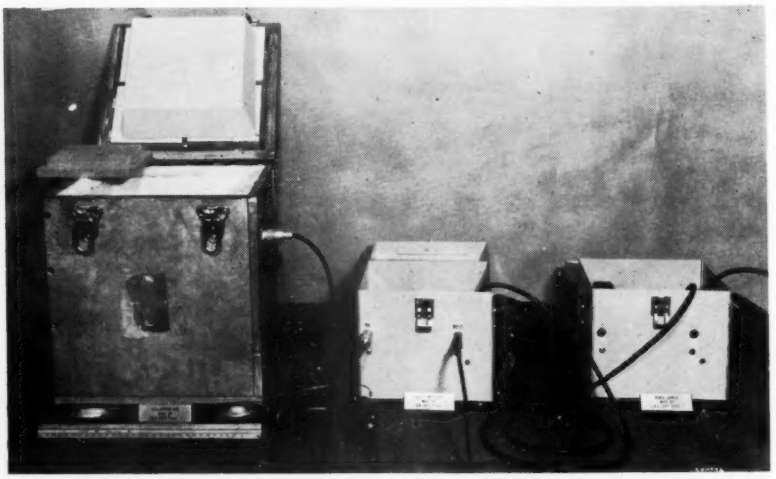


These split kernels look perfectly sound from the outside. But inside are worm-like larvae shown here, which would soon develop into adult Augoumois Grain Moths.

Kansas State Develops

Grain-Pest Detectors



Listening device built at Kansas State College detects insects hidden in kernels of grain. Essentially the machine consists of (l. to r.) a soundproof box with a built-in microphone, an amplifier, and power supply.

RECENT grain insect detection discoveries by Kansas State College[1] scientists may help PCOs sell grain sanitation services to grain dealers, who are suffering heavy money losses because of government condemned, infested grain.

KSC investigators have come up with two detective devices which locate insects hidden in wheat kernels and one gadget that separates good from condemned grain portions. All three instruments are potentially valuable to the "grain conscious" PCO because with them he can offer customers a real money-saving pest control program.

The three "bad news to grain pests" machines are: (1) A listening device that uncovers areas of insect infestation and does away with hit and miss methods of pin-pointing trouble zones; (2) An X-ray technique that spots insects in all stages of development; and (3) a money-saving, simple blowing device which segregates wheat kernels containing insect exit holes from grain run through the blower.

• Listening Device

The listening device is a portable machine, small enough to be carried in a car trunk. Plugged into a regular 110-volt current, it permits operators to hear insects crawling or gnawing inside grain kernels.

Essentially, it consists of a sound-proof box, with a tiny microphone, a low-noise level amplifier, and a loudspeaker with earphones.

With this method, it is reportedly a simple matter to tell whether or not stored grain is infested. Experienced operators can determine if noises are of insects in the larval, pupal, or adult stages, and the degree of infestation present. Insects in the egg stage make no noise so cannot be detected, but larva only a week old are active enough to be heard.

A major advantage of the sound device is that fumigant effectiveness can be checked almost immediately instead of having to wait several weeks for surviving insects to emerge.

With other attachments, this machine will record insect sound wave patterns. Persons who have heard the loudspeaker of the device testing infested grain, report it will probably go a long way in selling pest control to farmers and grain dealers.

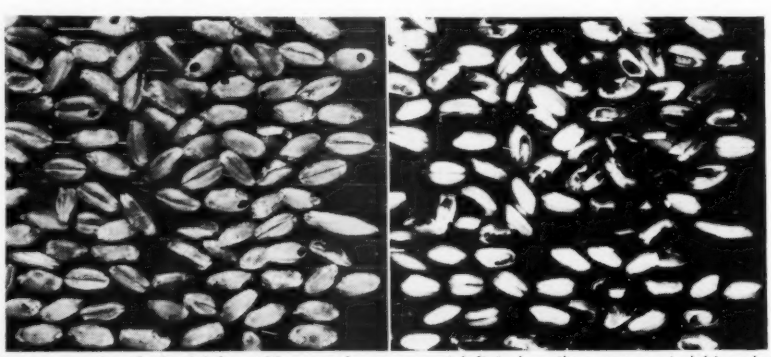
• X-ray Spots "Marauders"

Another method designed to nip insect damage is an X-ray technique[2].

This technique spots insects in all periods of development including the egg stage, making it immediately possible to determine the degree of infestation in a granary. The gelatinous material used by female insects to plug holes in grain kernels after they have deposited eggs also shows up on the X-ray.

Egg-cavity "plugs" appear the same as the remainder of the

(Continued on page 58)



Compare grains of wheat taken with a regular camera at left to how they appear at right under the X-ray used to detect internal infestation. The grain was arranged so identical kernels can be checked in each picture.

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B & G research finds the new features you need to improve your specialized PCO spray operation.

FULLY GUARANTEED

PCO's nation-wide use B & G sprayers exclusively because:

ONE GALLON

One gallon stainless steel tank, brass pump unit, adjustable carrying strap, brass shut-off valve, 4-ft. hose unit, 9" angled brass extension, and fan pattern nozzle.

Model 100-S $24.50

With Versatile Multeejet Nozzle

Have four different types of spray patterns in one nozzle simply by rotating tip and tightening retainer ring with finger pressure.

Model 104-S $27.23

TWO GALLON

Two gallon stainless steel tank, brass pump unit, adjustable carrying strap, brass shut-off valve, 4-ft. hose unit, 18" angled brass extension, and fan pattern nozzle.

Model 200-S $29.75

With Versatile Multeejet Nozzle

Four types of spray patterns in one nozzle. Simply rotate tip and tighten retainer ring with finger pressure.

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for a PCO spray job, use the proven 1 gal. size . . . large enough yet light to handle. For industrial applications where large volume is required, use the 2 gal. size.

Light in Weight —

easier to work with on the job . . . where portability means speed with less fatigue.

Stainless Steel Tank —

and all brass fittings — chemicals cannot injure your sprayer, and maintenance disassembly is quick, trouble-free.

ELECTRICALLY WELDED SEAMS

OIL AND CHEMICAL RESISTANT HOSE

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manufacturers and distributors of pest control products

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"Serving the Pest Control Industry"

Pigeon, Sparrow, and Starling Control

by

DR. E. R. KALMBACH
Biologist

U. S. Fish and Wildlife Service
Wildlife Research Laboratory
Denver, Colorado

PART II

Concluding Installment

A true conservationist, Dr. Kalmbach's studies of bird control have resulted in measures that meet with approval of most animal protective leagues. Last month this wildlife expert and artist presented the first in this two part article. He wrote of pigeon and sparrow control and introduced reductional methods for starlings. In this installment Dr. Kalmbach completes the discussion of sparrows and evaluates some of the control practices, many fruitless, being tried today.

●

• Dislodgment Effective In Control

THE BUILDING roosting habit naturally must have had a beginning some time after man started to go up into the air with his business establishments. In fact, observations in London indicate that the habit had its beginning there at about the start of the present century. In this country it became evident only after large populations had built up along the Atlantic Coast.

One usually looks upon the nightly gathering of the starling clans more or less as a mad scramble to find the most advantageous roosting spot before some other bird gets it. To a large extent this is not true. Although there is ample rivalry among the gathering hordes particularly if a cold evening has added thousands of individuals to the roosting flock, there is also an all-pervading urge on the part of individual birds to select their own predetermined roosting spot.

Let me recite conditions as we found them in the Washington roost in the late twenties. At that time the old Land Office Building was a favorite starling hangout. The ledge above every window was filled to capacity, each with its regular quota of nightly lodgers. To test the value of ledge elimination we prepared a series of wooden blocks (Figure 2), triangular in their cross-section and of a length equal to that of the ledge. When these were in place, there was no level space on which the birds could roost, and the displaced individuals had to seek new quarters. One night a strong wind dislodged one of the wooden blocks and again the flat ledge became available for starling occupancy. Yet, despite the fact that there were as many starlings as usual on all sides, not a one occupied the newly available ledge. This condition prevailed for the better part of a week before a few individuals, possibly newcomers, began to occupy the vacant space. This rather clearly indicated that those birds which had been dislodged when the wooden blocks were placed on the ledges had acquired other locations to which they were returning and that there was no urge to return to their former locations.

I recently read an account of a similar situation told by Dr. William Rowan of Edmonton on his observation of starlings in London. He was studying the effect of city lights and nightly commotion on the roosting birds and had occasion to collect specimens. To use his words we find that "some 40 birds were roosting in an unbroken series on a ledge between two cornices. *** Two successive shots cleared out 13 birds from the center of the string. The remainder *** stayed where they were. The following night the site was revisited. The whole of the middle portion of the ledge from which the samples had been collected, was empty yet at the two ends were the remaining birds occupying the same space as on the previous night. *** It was three weeks before the vacant space was more or less filled up."

So, you see, what has the general appearance of a mad scramble to find roosting space, may, in fact, be a no more disorganized performance than that which we see at any important football game where each spectator is endeavoring to find his own seat before the kickoff.

Here again, I am reciting matters of ornithological interest because they lend strong evidence to the fact that, once a roosting starling has been dislodged and has found another peaceful abode there is no urge for him to return unless, perchance he has again been dispossessed of his lodging place. As a matter of fact, the

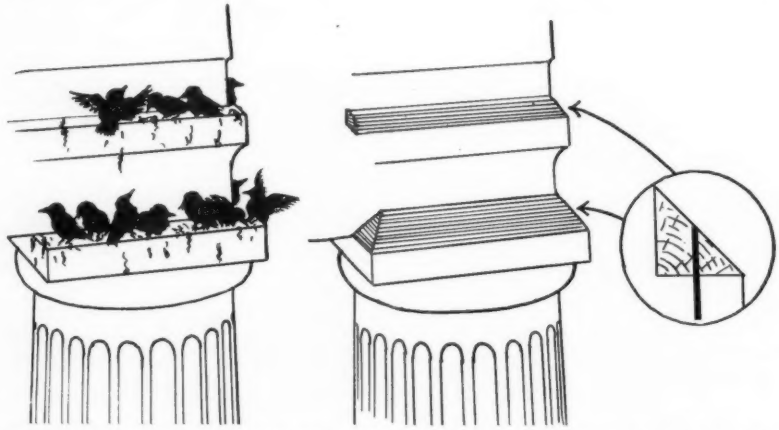

Figure 2. Control of objectionable bird roosts can begin at the architect's drawing board, but if it is not done there, conditions may have to be corrected on the building itself through the **elimination of roosting ledges.**

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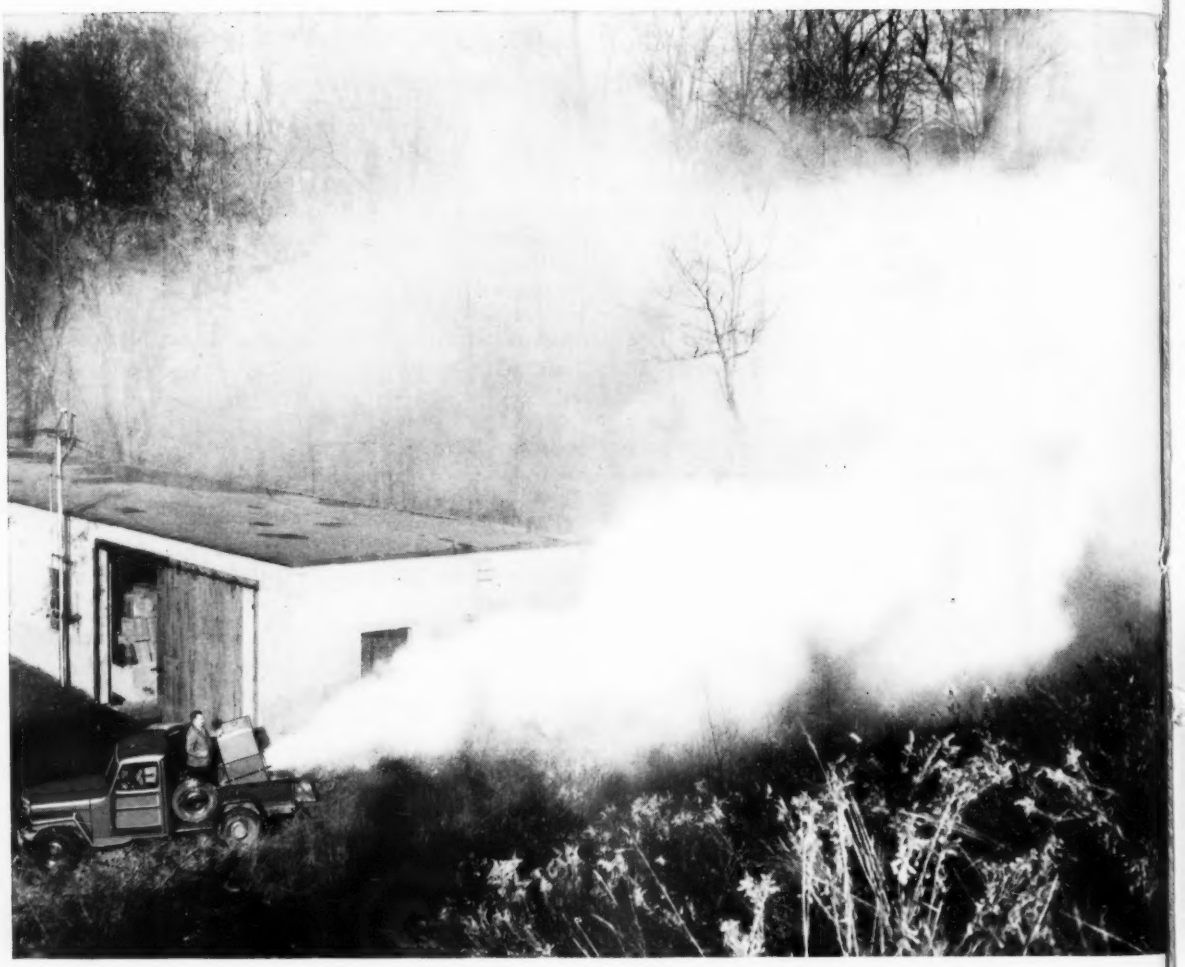

Dust fogs and fogs generated from oil or water bases have a rolling effect because they are produced at gentle low pressures. Bouncing over the terrain to the areas at which they are directed, these Microsol fogs completely envelope and surround all exposed surfaces of trees and foliage, touching everything in its wake from the ground up to the highest branches. The Microsol 403D thus gives positive control over a greater distance than any other unit known to us.

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Add the jet-head director to the 403D, as shown at right center, and it disperses water emulsions. With a directional fantail, lower right, it becomes a duster and granule disperser, whose particles can be directed anywhere. Both the jet-head director and the fantail are standard equipment with the 403D. Thus, by the proper use of this equipment, the Microsol 403D will successfully handle the following: 1) oil solutions, 2) water emulsions, 3) dust, 4) oil and dust, and 5) granules and weed-control products.

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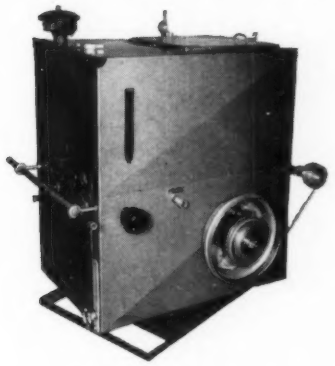
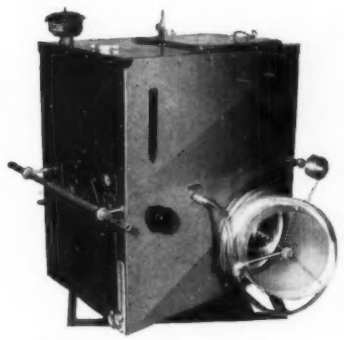
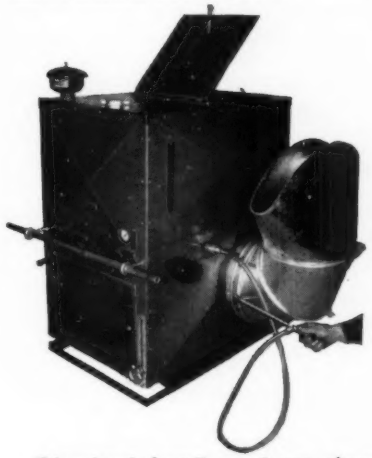
3 MACHINES IN 1



Aerosol mists are produced by the Microsol 403D in form shown above. Suitable for fly and mosquito control by adulticiding with oil solutions. Also can be used for field dusting.



Jet-head director has been added in photograph above. Now the 403D can be used for larviciding and adulticiding with water emulsions and insecticides miscible in oil. Plain or wetted dusting of row crops also is possible. Jet-head can be directed through 280°.



Directional fantail, as shown above, changes 403D into a duster that is ideal for tree and orchard work. Larviciding can be done at same time with gun jet, also shown in photograph. Fantail also can be rotated through 280°.

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starlings on the Old Land Office Building to which I alluded left those premises years ago and, as far as I am aware they never returned although the same window ledges remain as available as they ever were. All of this means that, if effective dislodgment has been accomplished from a premises one may expect further immunity provided some other situation in the general roost has not dislodged birds which will be looking for lodging accommodations.

This basic principle should be borne in mind whatever the method of starling removal that had been used — netting, ledge eliminators, frightening devices or the shot gun.

The problem of the starling in its various aspects is one of prevention and avoidance rather than of reductional control. I say this for several reasons. In the first place, the total number of starlings now established in the United States and Canada is enormous; their range is continent-wide. They are definitely migratory, thus shifting their problem from place to place; and lastly, despite their shortcomings, they have redeeming insectivorous habits that are outstanding at some times and places. If, therefore, the bad can be curtailed, if not wholly prevented, while the good is retained, that is the best approach.

• Reductional Control

Reductional control, and by that I mean trapping, poisoning, gassing, and shooting also has numerous limitations and, under some conditions is quite impossible. Only under conditions of food scarcity in winter with the ground snow-covered can these birds be induced to take poisoned baits about city dumps or other limited feeding areas. At other times the flocks much prefer to follow their customary habit of seeking their food from open fields where they wander from place to place. Trapping is subject to the same limitations with the exception that occasionally the birds frequent church towers or other partial enclosures which can be rigged to capture or gas the confined birds. At best, however, only a small portion of the total population would be so situated. Shooting, also, has its own shortcomings as a reductional procedure since the birds readily scatter from roosts persistently shot into and you have a situation of rapidly diminishing returns for your effort.

In combatting the objectionable city roosts several measures of prevention or avoidance are available; in each case, however, the end product is a movement of the birds from the protected property to some other point where they may or may not be equally objectionable. Once caused to move there is no assurance where the birds will take up their new abode, but since the individual who employed preventive measures will benefit there will always be a demand for such service.

• "Fireworks"!

The late summer or fall tree roost, usually in residential sections, can at times be moved by persistent gunfire (city fathers permitting) and by the use of pyrotechnics in the form of Roman candles or even a powerful fire hose. Failure in these efforts usually can be attributed to lack of persistence and to the fact that operations were started too late in the evening after many of the birds have become established for the night. Whatever the method employed it should begin on the arrival of the first birds and the objective should be to prevent if possible the peaceful settling of any in the roost area.

To combat the building roost several approaches are available. Frightening measures have included the use of slingshots with small projectiles, inflated balloons, hoses, supplied with air pressure that kept them moving and the acetylene firing device manufactured by a western company. I will mention the stuffed owls merely to complete the record, nothing more.

When roosting ledges are located immediately below overhanging caves it is often possible to use netting of the fish seine type to completely exclude the birds. Four months' installation (November to February, inclusive) is all that is needed, whereupon the nets may be removed. More permanent prevention rests with the installation of sloping

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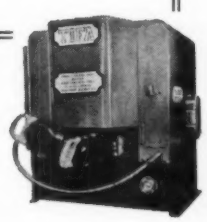

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surfaces, 45 degrees (Figure 2) over all flat ledges commonly used as roosts. Both wood and plastic have been used in this manner.

In looking to the future one may even give serious consideration to the architectural features of new construction. The modern office building with its steel, concrete, tile and glass, can be made essentially "bird proof" by eliminating all ledges in protected areas. Therein lies a marked advantage over the classical structures with their porticoes, overhanging eaves, ledges and ornate capitals to row on row of fluted columns.

There also are on the market several metal accessories in the form of vertical spines that can be installed on flat ledges, making them less attractive to the perching birds. Some of these come in more than one pattern to combat starlings, sparrows or pigeons, as the case may be.

Still another novel but rather expensive approach is the installation of an uninsulated electric circuit of high voltage but low amperage on all ledges and cornices used by the birds. This procedure is engaged in by at least one commercial company in the East and its effectiveness has been attested by a number of satisfied customers.

How durable these installations and their circuits will be after exposure to wind, rain, sleet and snow, I cannot say; neither do I have information on maintenance or operating costs.

• Year 'Round Vigilance May Not Be Necessary

There is one aspect of roost elimination whether it be with netting, wooden or plastic blocks, metal attachments, or electronic devices, that is well to bear in mind. That is the point I stressed earlier, to the effect that, once a group of roosting birds has been dislodged from a building and has become established elsewhere, there is no compelling urge to return to their former roost. That being the case, it often happens that once the birds had been moved, buildings might be relieved of their netting and other devices. Certainly the seasonal aspects of winter roosting would preclude the need of all-year treatment if removable installations do the work.

In the orchard or berry patch, shooting, where safe and legal, will take care of local offenders and on small areas or individual trees in the dooryard cheesecloth or netting will save the crop against starlings, robins, orioles and other fruit eaters. Here also, the netting need be installed for only two or three weeks when the fruit is in its vulnerable stage. Among the more effective frightening devices for larger orchards is the automatic acetylene firing gun previously alluded to.

• Doubts Value of Ultrasonics

In closing, it is appropriate to comment briefly on two suggestions for bird control that have struck the popular fancy and about which one often encounters publicity. I refer to the use of high frequency sound vibrations and electric (radar) impulses as area repellents. Although the two are frequently associated in people's minds they are radically different in character and are governed by different physical laws. Furthermore, although birds are known to perceive sound vibrations (at least within a portion of the range detectable by the human ear), we do not know through what physiological mechanism they may become aware of electromagnetic pulsations.

Work done at Cornell University and elsewhere has shown that a number of our common birds have a hearing range that is more restricted than that of the human ear. Whereas there is great disparity in the hearing ability of different individuals, the average person can perceive sound at an upper level of about 16,000 cycles per second and at a lower level of 20 cycles per second. Brand and Kellogg, working with the three common species discussed here, found that "man hears about four octaves lower than pigeons, and five lower than starlings and English sparrows. At the high end of the hearing range, man normally hears at least as high as starlings and sparrows and about an octave higher than pigeons."

With such reactions to sound vibrations it readily becomes apparent that the ultrasonic vibrations (those above our hearing range) are also not perceived as sound by these birds. That being the case it is rather futile to think of frightening them by vibrators that emit pulsations in undetected ranges of sound. If sound vibrations are to be used they will have to be in the humanly audible range and we also will have to undergo some discomfort while we are endeavoring to disturb the birds. This has, in fact, been done with the siren-like mechanisms equipped for propelling the sound directionally for effective results. Though I am not prepared to make definite predictions, it is my conviction that, with continued use, such devices will lose their efficiency.

There is one other quite general assumption made by those who advocate the use of ultrasonic vibrations, and that is that they are inevitably frightening to birds. This, no doubt, is stimulated by the wishful thought that it would be wonderful if it only worked out that way.

Now do not get the impression that all high sound vibrations, in unlimited volume are not harmful.

Vertebrates can even be killed through encountering sound vibrations (audible and inaudible ones) if their intensity is great enough and the victim is close to the source. Likewise, there are marked differences in the reactions of the three species of birds being discussed here and certain small mammals whose hearing range may be quite different from ours and the birds.

In this connection I may quote briefly from the summary of a report by Lee W. Arnold, formerly with the Fish and Wildlife Service, who conducted experiments in collaboration with the Physics Laboratory of the Bureau of Mines at Salt Lake City. Pintail and mallard ducks, chukor partridges, house finches, white-footed mice, white laboratory mice, and white and hooded laboratory rats were tested for their response to ultrasonic (24 kilocycle) and audible (10 and 5 kilocycle) sound vibrations. The 24 kilocycle generator radiated .10 acoustic

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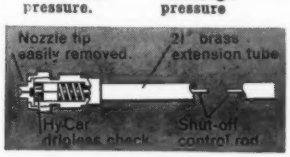

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watts, the 10 kilocycle generator, 9.2 acoustic watts, and the 5 kilocycle generator, 5.0 acoustic watts. (For means of comparison it may be mentioned that the human talking voice generates about 0.01 acoustic watt.) Except in the case of the laboratory mice and possibly the rats, there was no response to the 24 kilocycle sound even when the animals were placed within a few inches of the source of sound. Ten feet away no animal responded in any manner to the 24 kilocycle sound. At close range most of the birds and all of the mammals gave evidence of receiving the stimulus afforded by 10 kilocycle sound, which, of course, was humanly audible. A hooded rat, a white mouse and a house finch succumbed when confined within a few inches of the source of such vibrations.

Here again animals confined at a distance from the source of the sound showed no ill effects, a fact which is understandable when it is realized that sound vibrations lose their intensity roughly in a ratio inverse to that of the square of the distance from its origin. This latter physical law mitigates against the possibility of projecting objectionable sounds long distances unless the volume is enormous at its source.

Although birds and mammals are, of course, responsive to the shocking power of electric currents and may display an aversion to those of very low amperage as is the case with some of the installations used to combat roosting birds, we know less about the ability of wild creatures to perceive impulses of the radio or radar type. The evidence is still limited and conflicting that migratory water fowl react to the influence of radar beams but there is no indication that such forces can be used effectively in removing objectionable roosts of birds or discouraging birds which may approach them. Although there has been work done to determine the reaction of homing pigeons to electromagnetic impulses, the results are by no means convincing, certainly not significant enough to base any hopes or expectations on its use in avian pest control.

I have mentioned the present outlook with respect to the possible utility of sonic, ultrasonic and electric vibrations to temper the frequent rosy accounts one encounters in the public press on matters of this kind. Most assuredly I have no desire to lessen in the least, constructive research in the merits of any rational procedure that will give aid to plagued human beings who are the victims of commensal birds or mammals. There still are unanswered questions if not unsurmountable difficulties before either approach can be considered as practical and economical. It is in that direction that I should like to urge renewed effort by all agencies concerned with such matters.

The research should not, however, be restricted to those fields which, for the moment, arouse great popular fancy or which, because of their novelty, obtain substantial free advertising in pictorial weeklies. Problems of that kind are not solved by bursts of enthusiasm nor by the opportunism of those who would sell a bill of phony goods to the unsuspecting public while the talking is still good. The chances are that, barring the unforeseen, the solution will come by the additive efforts of numerous agencies and individuals, both investigative and operational, whose collective mission in our world is to make it a better place in which to live.

Grasshoppers, Chinch Bugs, Mormon Crickets Threaten

Grasshoppers, chinch bugs, and Mormon crickets might be more than normally troublesome this year, the U. S. Department of Agriculture reports.

Grasshopper headaches are expected to be most severe in Missouri, Wisconsin, and parts of Kansas, Iowa and Illinois. Most of the western states might also become seriously infested.

Mormon cricket invasions are expected in five far-western states —Idaho, California, Montana, Nevada and Utah.

Chinch bugs are predicted in most of the mid-western grain producing states in large enough quantities to do real damage.

PEST CONTROL

primer

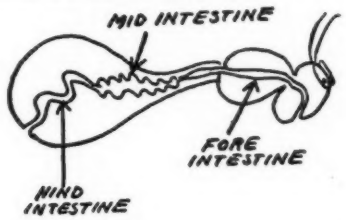
WHAT IS AN INSECT? VI

Written and Illustrated by
Professor Glen E. Lehker
Extension Entomologist, Purdue University, Lafayette, Indiana

In the concluding two parts of Lehker's Purdue PCO Conference illustrated talk on basic entomology, he describes, in easy-to-take form, what's inside the basic insect.

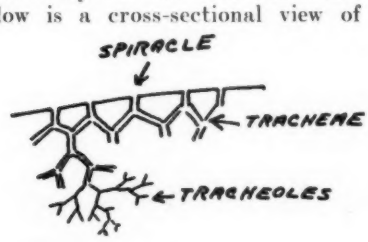
Insect Systems 1.

Like other animals, insects must have food to live, and they do have a digestive system. Below is a sketch of this system. It is made up of three parts: the fore intestine, the mid-intestine and the hind intestine.



The chitinous external skeleton which covers the body also extends inside the full length of both the fore and hind intestine. When the insect periodically sheds its "skin", the covering on the fore and hind intestine is also shed. So, naturally, the largest part of food absorption takes place in the mid-intestine, although some nourishment may be absorbed in the fore and hind sections.

Although insects do, in a sense, breathe, their respiratory apparatus is far different from higher animals. In my earlier diagrams of external features, you saw small dots along the underside of the abdomen and thorax. These tiny holes are called spiracles, and they act like ventilators. Below is a cross-sectional view of the respiratory system, showing how air is brought into the body.



As you can see, the insect's respiratory system works something like a city gas main network, and incidentally, it's quite efficient. The spiracles open on to the tracheae, or main tubes. From the tracheae this network branches out into smaller tracheoles which reach deep inside the insect's body. These tracheoles subdivide until almost every individual organ, tissue and cell is ultimately reached by one of these tiny tubes. While there is no regular "breathing", if you look closely at some insects you'll notice a slight external movement of the body walls which may help force air inside. It is also believed insects may have internal muscle movements which aid in this process.

Many species have fine hairs or other blocking devices around the spiracles which can shut off or deflect the air flow when necessary. It may be this ability to stop air flow which makes some species more difficult to kill with insecticides, especially fumigants. This protective apparatus works in much the same way as nose hair or ear wax in humans, shielding vital areas from foreign matter.

Next Month: Insect Systems 2.

USDA Bulletin Summarizes Insect Control Progress

A recent U. S. Department of Agriculture bulletin, "Fighting Our Insect Enemies," summarizes 100 years of insect control progress in this country.

In keeping with this year's observance of a century of professional entomology in America, the publication outlines the 100 years of research to combat insects that attack man's health, food, and shelter.

Target of American entomologists during the past century has been some 10,000 species of insect pests. Among entomology's major accomplishments are the successful fights against house flies and mosquitoes which resulted in making such diseases as typhoid fever, malaria, and yellow fever rare in America.

A single free copy of "Fighting Our Insect Enemies" may be obtained by writing the Office of Information, U. S. Department of Agriculture, Washington 25, D.C.

PEST CONTROL

notebook

WHAT IS IT? VI

This month another member of Pi Chi Omega describes insect damage for pest control men to identify. We'll give you a hint: they're all cereal pests. By recognizing the signs of infestation, you'll be able to administer proper control methods. It's no waste of time to become skilled in this important phase of your work. You can save time, do work more quickly and more effectively, get more income.

Prepared by John V. Osmun

A. Whole grains of corn, wheat, and oats with germ or embryo eaten out leaving an oval shaped pocket in the grain. Containers such as sacks, cartons, and boxes with oval holes (3/16"-3/8"). Boards, beams, and even balls of twine near food with oval holes 1/2" or more in depth, often numerous enough to weaken timber. Most of damage as described done by larvae, but adult, too, eats grain and grain products. What is it?

Answer on page 66

B. Machinery in flour mills and bakeries with the inner surfaces matted with thick webbing stuck with particles of food. Gears and levers often so clogged with webbing that equipment cannot be run, and plant has to be shut down to clean the machinery thoroughly. Seeds, nuts, dried fruits and other stored food sometimes balled so thoroughly with webbing that they cannot be shaken from the container. What does this kind of damage?

Answer on page 66

C. Boxes of cereal, bags of flour, and containers of prepared mixes with their inner linings and top of food lightly covered with webbing. Damaged ears of corn often covered with loose, dangling webbing. In unusual situations of confinement, silk may be woven into sheets resembling soft tissue paper. Recognize this one?

Answer on page 66

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A Section of PEST CONTROL magazine

TERMITES

and other enemies of wood

"Do It Yourself" Fad Invades Termite Control; What Can You Do About It?

The "do it yourself" fad that is sweeping the country today has even entered the field of termite control. Each day brings reports of home owners who have experienced disastrous results or near catastrophies because of haphazard amateur termite control.

Why is it that the average American will call in an expert for certain types of highly specialized home services but feels perfectly qualified to rid his own residence of a termite infestation?

The answer seems to be two-fold:

First, certain opportunistic businessmen have pushed the "do it yourself" home program to the point where home owners no longer think they need the service of a "professional" for any reason.

A good example of this opportunism is the recent report on a New York company which advertised in metropolitan newspapers that it had a product that was "an easy and pleasant smelling way to protect your house from termites." Gullible citizens who sent in $3.98 for this "amazing" offer received **six ounces of PDB moth crystals!**

Second, a lack of publicity and industry salesmanship on the part of termite operators has left the public "nonchalant" about the service a good, reliable termite control firm can offer. When the consumer thinks all he has to do is "spread a few chemicals around" to rid his home of termites, he is demonstrating typical public ignorance of the problem.

Certainly the average individual would not attempt to make a delicate adjustment to his wrist watch or TV set. Yet his home represents a much larger financial investment. It seems evident that a no-punches-pulled public relations program is in order to bring the facts of termite control before the public.

• Blasts Amateur TOs

Dr. Thomas E. Snyder rips into this problem in a recent newspaper story in the Washington,, D.C., Post.

"Some home owners are being misguided by instructions for easy, cheap ways to get rid of termites.

"It sometimes appears easy to stop termites from getting into a house buillt upon piers or foundation walls or with basements. When the owner applies his own remedy, he feels secure if he sees no more evidence of termites right away.

"But before long he may discover damage.

"That's why termite control is chiefly a job for experienced operators.

"Houses built over concrete slabs were once believed to be 'termite proof'. Many home own-

Termite Picture of the Month

NEW BI-MONTHLY FEATURE

Below is an unusual picture of a pair of badly damaged shoes which provided a full course dinner for a horde of hungry termites. Every other month from now on **Pest Control** will print an unusual or interesting termite shot under the heading, "Termite Picture of the Month." If you have an interesting picture depicting some phase of termite work send it in along with a brief identifying explanation. Maybe your photo can be the next "Termite Picture of the Month."

It didn't take termites too long to make this pair of shoes practically unrecognizable. This picture is the first of a series of photos that will show interesting and unusual termite damage.

ers now sadly know this is not true.

"Control of subterranean termites infesting slab-type houses is a problem even for the expert with a knowledge both of the habits of termites as well as details of construction. Sometimes the termites come up from the soil through expansion joints which have a penetrable filler. These joints are often under wooden partitions. They often come up through minute cracks in the slab itself. Merely pouring a toxic chemical around the outside of the house will not stop the termites.

● It Takes "Know How"

"The concrete must be drilled and chemical soil poisons injected through it to the soil, under pressure. This requires 'know-how' and expensive equipment. If drilling is done where there are pipes or wiring under slab, care must be taken not to drill through them. Blue prints as a rule do not show the exact location of piping, merely a generalized or conventional indication as to where they have been installed. An error can be costly.

"If too much chemical is injected under the slab there may be an overflow which will stain or ruin rugs and carpets.

"Even after a slab house or building has been thoroughly treated, regular inspections are necessary to make sure the termites don't find a way to get back in. This usually means removing the baseboard periodically. Reinspections are easier if baseboards have been installed with screws or clips instead of nails."

Dr. Snyder continues by hitting the crux of the problem—a point TOs might well emphasize to their customers.

"Because of the many hazards in attempting to control termites in any type of structure, an experienced operator should be entrusted with the job of treating and reinspecting infested property. As there are frequently 'fly-by-night' operators who make big claims of their termite control methods, it is important to make sure of the reliability of the firm whom you authorize to treat your property. A call to the Better Business Bureau or other organizations seeking to maintain satisfactory business practices is one way to check on firms offering reliable termite service."

● Burns House Down

Home-owners could well heed the experience of those amateur termite controllers who have run into plenty of trouble when treating their properties for termites. Here's what happened to one man in Montgomery, Ala., recently when he attempted to treat his property with his own brand of "easy" termite control.

He got rid of the termites! He also got rid of his house!

It happened like this: He was spraying for termites with a mixture of kerosene and creosote with his own crew of men. But he evidently forgot to turn off the pilot lights in his boiler. The result was an explosion which cannon-balled one of his crew 40 feet and burned him severely.

His home was destroyed in the resulting fire.

● Trapped For One Hour

Another "do it yourselfer" in Kansas City, Mo., didn't see any need for calling in a professional

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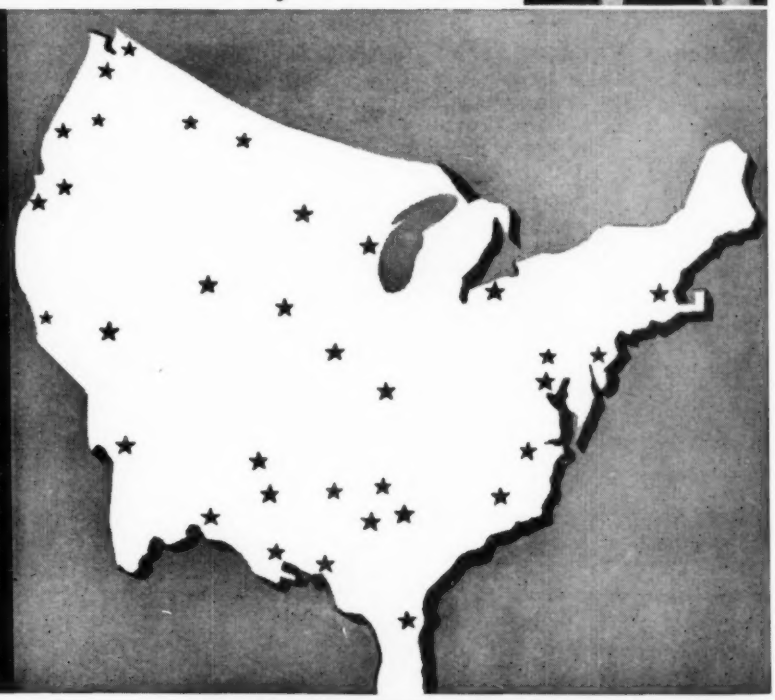

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TO to inspect for termites in his home. He decided to do it himself.

Result? He was trapped for over an hour in a space 14 inches high beneath the floor of his house. Here's what happened in his own words.

"I entered the space under the floor by a trapdoor in the living room floor. The house doesn't have a basement. I started inching my way toward the rear of the house on my back.

"Suddenly the floor above seemed to sag. I was almost beneath the kitchen. Then I couldn't move. A metal pipe was pressing on my throat and a joist held my right arm to the ground."

Police and firemen were called and luckily were able to free the victim after about 20 minutes of pushing, pulling, and tugging.

No serious injury occurred in this comedy, but it could have easily turned into a tragedy.

Professor E. Morton Miller, zoology instructor at the University of Miami, recently compiled a handbook on Florida termites. In one spot in the pamphlet Professor Miller states emphatically, "Employ only expert and licensed operators for fumigation and other termite treatments. **Do not attempt amateur treatment.**"

• Termite Educate Public

TOs can give a real service to their customers and the public by educating them in the complexities of effective termite control. Let the people know termite operators offer a professional service, one that requires plenty of technical "know-how" and proper equipment.

How are you going to do this? It's easy. For instance, send an article similar to the one we've quoted which Dr. Snyder wrote to your local newspapers. That's a start. Then use direct mail and handouts at meetings and exhibitions to publicize the approved procedures followed by professional operators with experience.

Take advantage of your speaking engagements to emphasize these points. Don't miss any opportunity to woo the public.

An educational and public relations program of this type will raise your professional standing, will make it hard for "shysters" to operate, and will offer a real service to the public as well as put money in your pocket.

Don't let prospective customers think they can "do it themselves"!

Okla. Cancels 4 Licensees

Clyde A. Bower, director of the entomology and plant industry division through which termite operators are licensed to operate by the Oklahoma State Board of Agriculture sent a form letter to interested public agencies which named four termite firms whose licenses have been revoked.

The following reasons were listed for the cancellations: (First Case) Misrepresenting methods of termite control for the purpose of defrauding; (Case Two) Using methods of termite control which were not suitable; (Case Three) Same as Case Two; and (Case Four) Same as Case Two.

Termite Drill Kit

Two sizes of handy carrying kits for rotary masonry drills are now being offered free by Termite Drills, Inc., with the purchase of a set of drills.

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What You Should Know About Termite Biology

By Dr. S. W. Bilsing

Dept. of Entomology, Texas A. & M. College, College Station

This is the first of two articles on "What You Should Know About Termite Biology," by Dr. S. W. Bilsing, of the Department of Entomology, Texas A. & M. College, College Station, Texas. In this installment Dr. Bilsing gives a brief introduction to termite biology and physiology and explains the habits and behavior of termite colonies. The second, and last, installment of Dr. Bilsing's article will appear in August.

Termites are widely distributed over the earth but are most numerous in its warmer parts. They have adapted themselves to a wide variety of climatic conditions. They have developed a colonial system of life which makes possible an association which may be comprised of as many as ¼ million in the U. S. and one and one-half to three million individual insects in the tropics.

● Termites Highly Organized

Termites are the only primitive insects which have developed such a system. Other social insects such as bees, ants and wasps which have developed a social system all belong to the highly specialized insects.

To protect themselves from ants and other enemies, termites build shelter tubes, mounds of earth and nests on trees, posts, and other wooden structures above the ground. These tubes, nests and other structures also enable them to maintain a somewhat definite level of temperature and moisture in their various types of habitations which no doubt make possible the production of thousands of individuals and their ability to destroy great areas of woody structures.

It has also enabled them to live in arid and semi-arid countries as well as those areas which have a more abundant supply of moisture.

There are 22 species of termites recorded from Arizona, the greatest number from any one state, although it is one of our most arid states. There are 18 species of termites in Texas.

It has been shown that a dry piece of wood in a desert may contain as much as six per cent moisture (and sometimes more!). Termites extract this moisture from the driest wood and use it over and over.

Unlike the higher animals it is not necessary for them to use this liquid in voiding the nitrogenous waste from the body. As in other insects, the products of destructive metabolism in the form of uric acid is in a powdered form and is excreted as a solid. It is not necessary to use this water supply in the body to void the waste from the body. They have a series of tubules along the rear end of the digestive tract which removes the water content from the food in the digestive tract before the waste products are excreted and pours the liquid back into the circulatory system and thus the small amount of liquid obtainable may be used over and over.

● Pellets Identify Termites

Since no liquid is necessary to wash the uric acid from the body, the excreta is passed from the digestive tract in the form of (1) deposits of excreted wood or (2) pellets and we use the shape and size of these pellets as a means of determining the kind of termites present in a given location.

The preceding brief remarks indicate why termites have so successfully become acclimated to such a wide range of habitats. They have developed a colonial system with a division of labor that is highly efficient in protecting them from their enemies and for conserving moisture, and they can utilize the most abundant of the organic materials—cellulose—for food. It can be readily understood that a colony of one and a half million termites can reduce a considerable amount of surplus vegetation to small bits and return it again to Mother Nature to grow still other vegetation.

Thus, it is not difficult to visualize a biological machine on legs which is adapted by nature to accomplish her purposes. Man, however, examines this in his own egotistical way and thinks of termites only in one respect and that is how they are going to affect him. He builds houses on the ground, strings telephone and telegraph lines and fences across the country, builds railroads with wood ties and finds they are in competition with him. So to find out what to do to combat them, we must attack this problem first of all by obtaining as much information as possible about their habits and biology.

Since there is a great variation in much of the known information about termite biology, it will be necessary to confine this discussion to the more common termites found in Texas.

● Three Termite Castes

There are three main castes in most of our common termite colonies, the royal caste, or the reproductive forms, the soldiers and the workers. The reproductive caste is in turn composed of three different types of individuals.

The colonizing or swarming type, or first reproductive form consists of members referred to as kings and queens. These are usually black or brown in color and have two pairs of wings which have a suture near their

(Continued on page 56)

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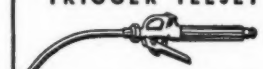

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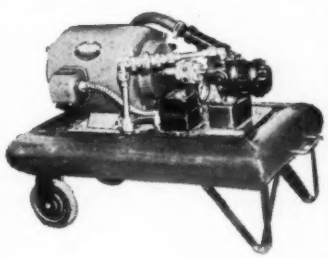

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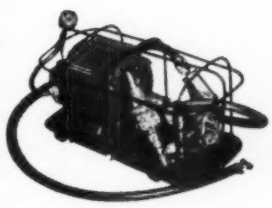

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Grain Publications Available To PCOs

By DR. RICHARD T. COTTON
Kansas State College

Here is a list of timely publications that will help make grain sanitation programs click. The best current thinking on the whys, wherefores and solutions to grain infestations is available to PCOs in these texts, written and edited by top-notch government and university authorities.

Copies can be secured by writing the agencies listed after each title. When requesting literature be sure to include the full title, number, and date of publication.

Causes of Outbreaks of Stored Grain Insects, Farmers' Bulletin 359, 1953. U. S. Department of Agriculture, Washington, D. C., and Agricultural Experiment Stations of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin.

Combatting Pests of Stored Grain and Food, Circular 337, 1949. University of Missouri, Agricultural Experiment Station, Columbia.

Controlling Insects in Flour Mills, USDA Circular No. 720, 1945, 20c. Supt. of Documents, Government Printing Office, Washington, D. C.

Control of Insects Attacking Grain in Farm Storage, Farmers' Bulletin 1880, 1941. U. S. Department of Agriculture, Washington, D. C.

Control of Insects Infesting Food Materials in the Home, The, Processed Publication Series No. 114, 1951. Canadian Department of Agriculture, Ottawa.

Evaluation of Fumigants for Shelled Corn, Circular E-855, 1953. U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, Washington, D. C.

Evaluation of Dusts and Sprays for the Protection of Shelled Corn from Insect Attack, Bulletin E-875, 1954. U. S. Department of Agriculture, Washington, D. C.

Experiments in Preventing the Build-Up of Insects in Newly Harvested Wheat, Circular E-850, 1952. U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, Washington, D. C .

Insects in Farm-Stored Wheat, Leaflet No. 345, 1953. U. S. Department of Agriculture, Washington, D. C.

Insect Control in the Country Wheat Elevator, Circular EC-24, 1952. U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, Washington, D. C.

Insects Attacking Stored Foods and Cereal Products, Bulletin 192, 1942. Michigan State College, Extension Service, East Lansing.

Insects Infesting Grain and Seeds, Bulletin 340, 1947. University of Minnesota, Agricultural Experiment Station, Minneapolis.

Insects Infesting Stored Foods, Bulletin 341, 1947. University of Minnesota, Agricultural Experiment Station, Minneapolis.

Insects Pests of Stored Grain and Grain Products, by Dr. Richard T. Cotton, 1952. Burgess Publishing Co., Minneapolis, Minnesota. Available from **Pest Control** magazine for $3.40 postage prepaid.

Storage of Cereal Grains and Their Products, edited by Anderson and Alcock, 1954. Monograph of the American Association of Cereal Chemists.

Book Prices Increase

Since running the list of book price increases of publications recommended for PCOs in the March issue, some of the publishers have notified us of additional price changes. The corrected list is as follows: **Chemistry and Action of Insecticides,** by Harold H. Shepard, $7.50 plus 25c postage; **Handbook of Agricultural Pest Control,** by Bailey and Smith, $3.75 plus 25c postage; **How to Know the Insects,** by H. E. Jaques, $1.75 plus 25c postage; **Medical Entomology,** by Dr. William B. Herms, $9.50 plus 25c postage; **Natural History of Mosquitoes,** by Dr. Marston Bates, $5.50 plus 25c postage; **Odors: Physiology and Control,** by Carey P. McCord, $7.00 plus 25c postage; **Sanitation for the Food-Preservation Industries,** $6.00 plus 25c postage; and **Textbook of Entomology,** by Herbert H. Ross, $6.50 plus 25c postage.

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letters

Osmun Analyses Yeomans On Residual Fogging

A. H. Yeomans' interesting comments (PC April 1954, page 6) on my article "Do Fog Machines Give Residual Control" which ran in September 1952 prompt me to offer a few observations.

There is no question but what the Dyna-Fog and the Tifa can be set to apply large enough particles of fog so that measurable deposits are realized. This is hardly an efficient or effective method to recommend, however, for applying residual-type insecticides as we know them. Dr. Yeomans points out that a special formulation is necessary for "residual action." I should like to analyze his recommendation in the light of practical fogging operations and the degree of residual that might be expected.

(1) Speed of application: One gallon per 100 feet of travel would necessitate a vehicle speed of less than one mile per hour (0.8 - 0.95 mph) even with the fogging machine set for 40-50 gallons output per hour. It is almost impossible to drive that slowly and no pest control operator would conduct his application at that pace.

(2) Quantity of deposit: One gallon contains one pound of DDT. One hundred feet traveled along a 100 foot swath would give 10,000 square feet surface for deposit. As Dr. Yeomans has said, only 25% of the formulation released can be expected to be deposited. This figures out to be 11-12 mg. of DDT per square foot. For a residual deposit of this insecticide, we normally aim for 200 mg. per square foot—18 times as much. It is doubtful that a significant residual, as we usually think of it in terms of time, could be expected from this application rate, especially if we are considering DDT and houseflies.

I know several men who have obtained residual deposits from fogging in isolated instances, such as on porches where the fog billowed and deposited and in heavy vegetation where conditions for deposit were ideal. This is fine when it comes as an incidental part of a fogging operation, but to set out intentionally to lay down a residual outdoors with a fog machine seems to me like brushing your hair with a tooth brush.

I would not want to leave the impression that I'm against fogging as a method of insect control, for on the contrary, I've been a strong supporter of the method. My contention is that we should use this valuable tool for what it is best fitted—space application of insecticides. This seems to me even more important now when residuals for fly control are scarce, and much emphasis needs to be placed on contact application. For the latter, the fog machine is a natural.

John V. Osmun

Assistant Professor of Entomology
Purdue University
Lafayette, Indiana

Stronger Mouse Baits

Stronger warfarin concentrations for mouse baits have been recommended to the U. S. Department of Agriculture by the Wisconsin Alumni Research Foundation.

Research work for the past three years on this problem has indicated that increasing the warfarin concentration in mouse baits from .025% to .05% results in a product (1) which will give more complete and faster kill against mice than the lower concentrations, and (2) which is not appreciably less acceptable to mice than the lower concentration.

USDA indicates it will now favorably consider applications to register baits containing .05% warfarin for mouse control.

Fly Bait Folder

Recommendations and usages of poison baits for fly control are discussed in a recent U. S. Department of Agriculture pamphlet.

Preparation and application of both liquid and dry fly baits are covered in this handy little, pocket-sized guide.

Just write the USDA, Agricultural Research Service, Washington, D. C. for a copy and ask for Bulletin EC-29, **Fly Control With Poisoned Bait.**

news

Atlanta PCO is new Getz president

Fellton Becomes Getz President

Herman L. Fellton, Atlanta, Ga., has been elected president and chairman of the board of Getz Exterminators, Inc. He recently acquired controlling interest in the corporation.

Glenn H. Burnett was re-elected a vice-president of Getz and will also serve as southeastern divisional manager. Mrs. Edna F. Raley, widow of the late Getz owner, Thomas C. Raley, is the new secretary-treasurer.

Mr. Fellton announced Getz would intensify and speed up the expansion program begun last year. "Total business done by our firm during 1953 was the greatest in its 66 year history," he asserted, "and the volume during the first three months of 1954 is substantially increased over any three month period last year."

A registered professional sanitary engineer, Mr. Fellton was a major in the U. S. Public Health Service when he first went to Atlanta during World War II. Prior to that time he served in a variety of capacities in the health and sanitation fields. He is a past NPCA vice-president and is prominent in several business and professional organizations.

Getz was organized in 1888, is the oldest pest control firm in the South, and operates in 15 states.

CSMA Proceedings Available

Chemical Specialties Manufacturers Association has published a report of its 40th annual meeting held at the Mayflower Hotel, Washington, D. C., December 7-8.

This 218 page, attractively illustrated manuscript is available in limited quantities to members and non-members for $7.50 per copy, postpaid in the United States and Canada.

PCOs can order copies by writing the association at 110 East 42nd Street, New York 17, N. Y.

Buettner Memorial Fund To Build NPCA Headquarters

In memory of the late William O. Buettner, first president of the National Pest Control Association, the NPCA has approved a resolution establishing the Buettner Memorial Fund. The fund will be used to purchase or construct a national headquarters building which will be named the "Buettner Memorial Building."

Any monies received in excess of the actual building cost, donations other than those for the Buettner Memorial Building, and any income derived from the building will be invested. This second fund will be used to promote research projects, to make awards, to recognize or stimulate achievements, to provide scholarship aids or structural memorials, "or to sponsor publications or other enterprises consistent with the commemorative intent of perpetuating the memory of William O. Buettner," according to George R. Elliott, chairman of the memorial selection committee.

Contributions to the fund should be sent to Mr. Theodore Oser, Chairman of the William O. Buettner Memorial Fund Raising Committee, National Pest Control Association, 30 Church Street, New York 7, New York.

Dr. V. C. Freeman, (left) Associate Dean of the Purdue University School of Agriculture, presents $200.00 NPCA scholarship award to **Davis K. Reed,** who maintained the highest average in entomology as a freshman. **Dr. J. J. Davis** (right), Dept. of Entomology head looks on.

Woodman Joins Velsicol

Dr. William J. Woodman has joined the Velsicol Corporation

Velsicol Mid-West representative.

as midwest sales representative. He will make his headquarters in Chicago.

Before joining Velsicol, Dr. Woodman was active in scientific associations and served as a consultant for several food processings firms in Wisconson. He has a'so worked on fly repellents and mosquito control at the University of Wisconsin where he rereceived his doctorate in entomology.

Poisons Booklet Now Ready

The 1954 annual publication of the Association of Economic Poisons Control Officials is now ready for distribution. The 200 page, six by nine inch booklet sells for $3.00 a copy.

Included in the book are association business concerning uniform laws, regulatory principles, definitions of terms, convention papers, executive committee activities and a resume of state pesticide laws. One section summarizes data covering approximately 150 pesticide chemicals on such topics as toxicity, empirical formula, antidotes, first aid, etc.

PCOs desiring copies should send their checks to Albert B. Heagy, secretary-treasurer, Association of Economic Poisons Control Officials, Inc., Box HH, University Post Office, College Park, Md.

William Morley

William Morley, 69, owner of the Washington Termite Co., Washington, D. C., until his retirement a year ago, passed away recently at his home.

He is survived by his wife,

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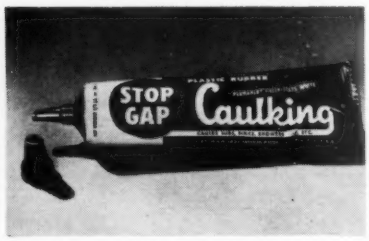

"Stop-Gap" keeps out insects.

New Caulking Compound

A new caulking compound, "Stop-Gap," is being marketed by Sapolin Paints, Inc. According to the company, this product looks and feels like white tile yet can be squeezed from a tube to fill cracks and crevices.

This plastic rubber compound reportedly will not shrink, crumble or discolor with age. It is said to be waterproof and helps stop rust and rot, useful for filling cracks through which insects may enter a building.

Sapolin says "Stop-Gap" can be used for frames, counter backs, mouldings, sinks, tubs, sills, flashing, casing and joints. It is simple to apply because of a new type nozzle spout container and it dries overnight to a smooth flexible inlay. Its tile-like surface can be repainted to conform with any decorating scheme both indoors and out, claims the manufacturer.

Further details may be obtained by writing the company at 229 E. 42nd St., New York 17, N. Y.

Water Soluble Warfarin

U. S. Department of Agriculture has registered water soluble warfarin on silica for general use in the control of rats and mice, Ward Ross, managing director of the Wisconsin Alumni Research Foundation announced recently. The result of several years' extensive laboratory and field experimentation conducted by Dr. Paul Link of the University of Wisconsin, this product is now commercially available through the Foundation's warfarin licenses, Prentiss Drug & Chemical Co. and S. B. Penick & Co.

According to the Foundation, water soluble warfarin on silica should be used as a valuable supplement or adjunct to dry warfarin and not as a replacement.

INSECT REPORT

Contains pertinent portions of the **Cooperative Economic Insect Report** issued by the U. S. Department of Agriculture, Agricultural Research Service, during the last 30 days.

AMERICAN DOG TICK
(Dermacentor variabilis)

Oklahoma: Reported frequently on dogs, occasionally on cattle. **Rhode Island:** Heavy in Warwick.

HOUSE FLY (Musca domestica)

Georgia: Heavy infestations building up in poultry houses with laying cages in southern part of state. **Arizona:** Abundant around Yuma earlier than usual. **South Carolina:** Became fairly numerous in most areas.

CLOVER MITE (Bryobia praetiosa)

Connecticut: Exceedingly annoying in homes. **Indiana:** More common than usual. Very bothersome in homes. **Iowa:** Occurs in isolated situations across state in such numbers as to constitute a nuisance and household pest. **Nebraska:** Migrations into dwellings generally heavy throughout state. **Rhode Island:** Numerous in some areas. **Washington:** Household pests at Prosser.

MOSQUITOES

Florida: Collection in eastern Alachua County showed that very low biting rates in February and March began rising in late March and are now at a definite nuisance level.

STORED PRODUCT INSECTS

Montana: Light to moderate damage during winter in scattered spots over the state. **Oregon:** Generally more abundant than during past several years.

SUBTERRANEAN TERMITES
(Reticulitermes flavipes)

Connecticut: Flights began in February and reached a peak in mid-April. **Rhode Island:** Especially large number of reports of swarming.

●

Readers noting unusual or serious infestation of insects and rodents in their areas are requested to send reports to **Pest Control** so they can be added to this government report each month.

Versatile Testa Microscope

A wide field, all-purpose microscope, reportedly good for insect identification is now being produced by Testa Manufacturing Co., 418 South Pecan St., Los Angeles 33, Calif.

One advantage of this new microscope is that its usefulness is not limited to inspection of specimen slides. It can also be used for the study of whole biological mounts, living insects, etc., the company claims.

In addition to normal position for desk or bench work, the arm or tube may be inclined or reversed to operate in any direction of a 360 degree circle. The chrome-finished microscope tube may be removed and used as a full-scale pocket microscope on field trips, Testa says.

It is adjustable to 15x, 45x and 75x magnification.

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Termite Biology

(from page 48)

base. The wings are shed at the time of the colonizing flight or shortly after by rubbing them against a post, rock or any kind of protuberance or they may be blown off by the wind.

Members of the second reproductive caste are usually white in color and have aborted wings, or short pads. They have heavier bodies than the first reproductive forms. The first reproductive form is monogamous but the second is usually polygamous. They are usually white in color and larger and heavier than the colonizing first reproductive caste.

The third reproductive form has the appearance of the worker but the female has no wings and is capable of laying eggs like the first and second reproductive forms. Because these reproductives look much like the workers, not a great deal is known about them.

● Workers Usually Blind

The workers and soldiers are neuters, that is to say, they may be of either sex but are not usually capable of reproduction. Workers are dirty white or cream colored, soft bodied and wingless. They are usually blind and make up by far the largest number of individuals in the colony.

They fashion the tunnels, build the shelter tubes and attend to all the important work activities connected with the colony. They develop to maturity in one year.

(To continue in August)

Termite Detection Device

A compact sound-detection unit which locates termites by their noises has been developed by Roy Pence, entomology department, and David Weems, electronics expert, both at the University of California, Los Angeles.

Consisting of a tiny microphone, a "hip-pocket" power unit and earphones, the unit may eliminate the present "bore-and-chisel" inspection method.

Roy Pence advises **Pest Control** the device is not completely perfected nor is it available commercially. He promises to send us full details as soon as termite operators will be able to purchase this tailor-made inspection tool.

Pivalyn Approved For General Use

Pivalyn, the new water soluble anticoagulant rodenticide formulated in a sugar base for exposure as a liquid bait, is now available for general use, Warren Dolben, president of the manufacturer, Motomco, Inc., announced recently. For the past 15 months Motomco scientists have been laboratory and field testing Pivalyn in cooperation with the U. S. Fish and Wildlife Service.

Dissolved in plain water, the product provides a sweetened liquid bait that is reported effective against Norway rats, roof rats and house mice.

When dissolved in water in accordance with the manufacturer's directions, the end concentration of Pivalyn in the liquid bait is only one part in 20,000. Although the exposure of water baits was initially considered to be most effective when used where other sources of water were not too freely available, Pivalyn sugar formulation has been effective even under wet and humid conditions, Motomco claims.

When you buy Flying Insect Control Vaporizers insist on the best with Columbia's New Improved 1954 INSECTICIDER models, whereby you cannot only promote your business but take pride in offering it to your customers as well. Insist on Columbia's features . . . Pioneers in the vaporizing field.

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Whitmire's DIRO Reported To Kill Flies, Mosquitoes

DIRO, a product of the Whitmire Research Laboratories, St. Louis, Mo., is one of the newer insecticides reported to give control of resistant flies and mosquitoes without objectionable after effects.

In numerous critical field tests, the company says, DIRO has proved to be a quick, effective and economical control of resistant flies, and mosquitoes in the larval, pupal, and adult stages.

DIRO is used as a spray, generally being mixed with oil, but it is also used with water for control of mosquito pupae and larvae and for control of other insects. It can be applied with any type of spray or fogging equipment approved by insect authorities, the company claims.

According to the manufacturer, DIRO leaves no health-endangering residue on fruits or vegetables, nor does it contaminate drinking water for humans or animals. Insects will not become resistant to DIRO, even after continuous exposure.

Whitmire says DIRO contains no chlorinated contact insecticides. It is formulated mainly of Rotenone-Rotenoid solvates. It produces uniform emulsions in hard, soft or salt water.

For further information and literature on DIRO, write Whitmire Research Laboratories, Inc., 339 South Vandeventer, Saint Louis 10, Missouri.

Newest CDC Films

Three new films of interest to pest control operators are now available through the Communicable Disease Center and United World Films.

1. "**The Genera of North American Ticks,**" filmstrip, F139, color, 4 minutes, 37 frames, 1953. This filmstrip shows: (a) representative species of the genera of North American ticks; and (b) morphological distinguishing characteristics of ticks.

2. "**Biology and Control of the Cockroach,**" filmstrip, F91, color, 9 minutes, 62 frames, 1953. The six divisions of this filmstrip are: (a) five common "domestic" cockroach species; (b) identification and life cycle of each species; (c) habits of cockroaches associated with human habitations; (d) inspection of premises for cockroaches; (e) control methods; and (f) summary.

3. "**Introduction to the Insects,**" filmstrip, F120, color, 10 minutes, 67 frames, 1953. Highlights of this filmstrip are: (a) importance of insects to man's welfare; (b) external and internal anatomy of insects; (c) life cycles; (d) principal orders of insects; and (e) insect relatives — spiders, ticks, and mites.

All CDC films are available on a free loan basis from Communicable Disease Center P. O. Box 185, Chamblee, Ga.

These films can also be purchased from United World Films, Inc., 1445 Park Avenue, New York 29, N. Y. Price list is available from either. CDC will send preview prints upon request.

When ordering be sure to include title and identification number given here.

Easy to Spray

At present Thompson-Hayward recommends Malathion E-5 for effective control of flies everywhere except in the home.

This new pesticide is highly effective even with DDT-resistant strains of flies. The U.S. Department of Agriculture calls Malathion "one of the safest insecticides to handle" and recommends its use for fly control *inside dairy barns.* Application lasts from 10 to 21 days . . . on manure piles, hog and calf pens, corrals, fences, poultry houses, horse and sheep barns, yards, around water troughs, city dumps, garbage cans and alley doorways.

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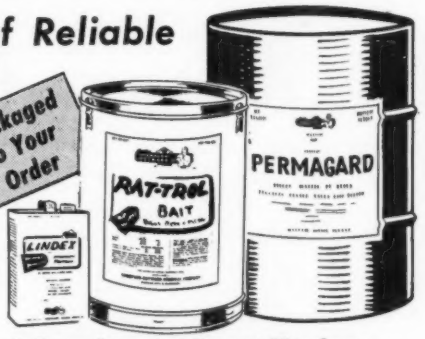

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VITA-RICH "Farm Tested" Feed Supplements

Fire Ant Control Outlined

Aldrin, dieldrin, and chlordane supply the best answer to the problem of controlling imported fire ants, say U. S. Department of Agriculture entomologists. This imported pest, now prevalent in the Southeast, can be destroyed by spraying its mounds with either of these three insecticides or, in case of widespread infestations, by applying one of the chemicals to the entire soil surface of the infested area.

Imported fire ants are fairly recent arrivals in the United States. First identified by entomologists in 1930, they are believed to have entered this country at Mobile, Ala., from South American ships. Since then they have spread through 10 southern states.

Complete control information is available in USDA leaflet 350, "The Imported Fire Ant — How to Control It." This easy-to-read, eight page publication contains illustrations that will aid PCOs in identifying and carrying out control measures against this insect.

Operators desiring a single free copy of this booklet should write the Office of Information, U. S. Department of Agriculture, Washington 25, D. C.

Approve Use of Diazinon

Geigy Chemical Corporation announces that its pesticide Diazinon 25W has been approved for limited use by the U. S. Department of Agriculture.

A technical bulletin is now available from the company which lists Diazinon limitations, toxicity, precautions, application techniques, etc. Operators desiring copies of this publication should write Geigy Agricultural Chemicals, Research Laboratory, 62 West 2nd Street, Bayonne, N. J.

New Chlordane Specifications

Velsicol Corporation has released new specifications for the clarified and AG grades of technical chlordane. According to the company these specifications are in conformance with federal and World Health Organization specifications. Former specifications, Form 93, is now void.

Operators may obtain a copy of these new specifications by writing the company at 330 East Grand Avenue, Chicago 11, Ill.

Stauffer ups Keating

Keating Now Sales Director

Dan J. Keating has been appointed director of sales for the newly organized Agricultural Chemicals Division of Stauffer Chemical Company, New York city, Hans Stauffer, executive vice-president announced recently.

Mr. Keating has been associated with Stauffer since 1926. He formerly served as manager of the company's Pacific Northwest division.

Sweetpotato Weevil Controls

"Dusting Stored Louisiana Sweetpotatoes to Prevent an Increase in Sweetpotato Weevils" is the title of a new E-series publication issued recently.

Authored by D. H. Gaddis, division of stored product insect investigations, BEPQ. and E. A. Epps, Jr. feed and fertilizer laboratory, Louisiana Department of Agriculture and Immigration, the bulletin, E-864, can be obtained by writing the Bureau of Entomology & Plant Quarantine, Washington 25, D. C.

Grain-Pest Detectors

(from page 30)

grain exterior, so they cannot be seen without dyes or other aids. Selective dyes have been used to make the plugs fluoresce brightly under ultra violet light. But earlier work by the Kansas State College scientists[3] with dyes did not satisfy them because finding the plugs did not answer such questions as: Did the eggs hatch? What stage are the insects now in? How much damage have they done? Are they dead or alive?

X-ray examination of infested grain now answers all these questions. It has been successfully used on both corn and wheat and reports indicate it is expected to work on any seed or natural material subject to insect attack.

With this X-ray technique PCOs can show customers immediate investigative results. Adopting the principles of the Polaroid-Land camera, which requires no darkroom or processing of film in solutions, a picture is available within two minutes after the X-ray negative has been exposed to grain suspected of insect infestation.

Commercial X-ray equipment, which can be readily adapted for this type of work, is currently available at a cost most pest control firms can afford, say Kansas State experts.

• Blower Separates Grain

A simple blowing device[4], like those used in seed-testing laboratories, has been developed to separate wheat kernels containing insect exit holes from insect-free kernels.

The blower was used to separate seeds of different size so the grain was strained through a number 8 and a number 9 sieve before being run through the blower. Kansas State is still testing and improving the blower technique.

Principal advantage of the blower method is grain condemned as unfit for human consumption can be separated into good and bad portions, and a higher price realized from the good grain.

With the Food and Drug Administration urging a clean-up of insanitary grain, farmers will certainly welcome a pest control insect detection service based upon methods such as those being developed at Kansas State College.

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Protect Stored Wheat

(from page 14)

In grain elevator storage, it is sometimes desirable to apply treatment as wheat is turned from one bin to another. Pyrenone can be added either by one of the mechanical devices (Fig. 4, pg. 9) or by hand into the auger conveyor. The calculated amount of Protectant (7.5 pounds per 100 bushels) must be applied evenly for best possible coverage of the grain.

For an average 80 foot bin in mill elevators and terminal storage, apply from 10 to 15 pounds of Protectant before any grain is put into the bin. This compensates for the amount that will remain in the air when the grain starts to flow. It also insures an adequate dosage in the bin hopper. Pyrenone is applied onto the conveyors that lead to the head house, or just ahead of the tripper on the conveyor belt. An automatic feeding device is effective for keeping the flow of Protectant in proportion to the grain flow.

• Treating Carry-over Grain

When you treat carry-over grain, the problem is different and PCOs should exert greater care to obtain the maximum degree of protection. Immature insects concealed in the grain kernels are not accessible to the Protectant until they emerge as adults. For light infestation (less than a weevily grade*), the Protectant cleans-up the infestation by killing adult insects when they emerge from the individual kernels.

Where weevily grade infestations occur, the frass produced by the feeding and development of the insects enables emerging adults to find refuge from the treatment. This condition can result in ineffective use of the Protectant against such primary invaders as the rice or granary weevil, and the Indian meal moth.

Two methods used to combat Indian meal moths are: (1) An aerosol bomb that is suitable to use around food, or (2) An aerosol type space spray treatment. USDA Circular E-835 revised suggests a spray which consists of one quart Emulsifiable Pyrenone 10-1 mixed with three quarts of odorless base oil and four quarts of tetrachloroethylene. The eight quart mixture is sufficient for killing flying insects in 100,000 cubic feet of space.

But even with a considerable amount of frass, the hard-to-kill cadelles and the flat grain beetles promptly respond to a well applied Protectant treatment.

For infestations less than weevily grade, Pyrenone Wheat Protectant effectively protects the grain by serving as a contact insecticide and as a repellent for longer than the usual periods of storage. In many instances, wheat has been protected for a year or longer before being shipped.

• Check Bins Every 30 Days

Continued observations over a period of time by PCOs are necessary for prolonged protection from infestation. Even after treatment with Pyrenone Wheat Protectant, check stored grain about every 30 days to make sure no reinfestation has occurred.

For spot infestations carbon tetrachloride is used extensively, often in combination with other fumigants. Four quarts of it may be employed as a carrier for one quart of Emulsifiable Pyrenone 10-1 which, without the addition of any oil, gives a total mixture of five quarts for use in 100,000 cubic feet of space. For webs of Indian Meal Moth larvae this formula may be sprayed onto the infested portions. Check the treatments of such spots and if living larvae are present, repeat the application.

Wheat at left was treated with grain protectant and is free from infestation. The untreated wheat at right has been almost entirely destroyed by stored grain pests. Both samples of wheat are from the same lot.

One of the best indications of grain condition is its temperature. Development of an abnormally high temperature at any location in the stored bulk grain is an indication that something is wrong. Don't assume when grain gets hot and damp at the surface that dampness alone is the cause. Part of the rise in temperature may be due to a developing insect infestation which starts from a high moisture content — possibly the result of a poorly closed door or a leak in the roof or wall.

PCOs must remind their customers if any portion of the grain contains an unusually high moisture content, fermentation of the grain and subsequent heating is a definite possibility. Not only will this cause loss of grain through development of molds, but it provides ideal conditions for rapid development of any insects that may be present, and simultaneously the moisture and molds will weaken or destroy the effectiveness of insecticidal dust.

Treatment of infested grains, today more than ever before, offers a challenge as well as a good financial potential to PCOs who will train for this type of work.

* Weevily grade means the presence of a granary weevil, rice weevil, lesser grain borer or Indian meal moth larva per quart sample of wheat, or as many as five insects of other kinds (such as flour and grain beetles, candelles or other grain moth larvae) per quart sample.

Insect Film Available

The Sinclair Oil Company has provided each state agricultural experiment station with a copy of its color, sound film, "500,000 to One." It is now available on loan from these stations. Sinclair produced "500,000 to One" as part of the 1954 observance of a century of professional entomology.

PCOs In Food Industry

(from page 24)

special interest to your industry at this time.

I would like to stress the importance of four qualities which, to my mind, are essential. Most apply to an individual and also to a business, or an association. These four qualities are:

1. Enlightened business statesmanship.
2. Good judgment.
3. Technical knowledge.
4. Honesty and integrity.

Perhaps I can best explain these qualities by examples.

First: "Enlightened business statesmanship." This is a $64 phrase but I think you will get the idea.

Former NPCA Technical Director, and now Executive Secretary. Dr. Ralph Heal, presented a very excellent paper before the American Chemical Society. This paper contained little, if anything, that was really new but brought information on various insecticides and rodenticides together in one place. It was a concise and clear presentation and, if widely distributed, should contribute greatly to a better understanding and appreciation of modern pest control tools.

More of this kind of thing will go a long way toward raising the stature of the whole pest control industry in the minds of the general public. It cannot help but result in more confidence, and hence more business, for your industry.

My second important quality was "good judgment". For my example I turn to an article in the January, 1954 issue of Pest Control magazine. This gem was taken from an article on control of odors from dead rats in inaccessible places, and I quote:

> Blow-flies are very helpful in that they speed up destruction of carcasses. Wherever possible, they should be encouraged. This can be done by opening a few windows in proper season. Any blow flies near will be drawn irresistibly by the odors long before they can be detected by the human nose. If you plan on using this help, don't wait for odors to develop first. Let some flies get in soon after you set out your baits.

Well, technically and biologically the gentleman is correct. Good judgment? Well that is something else again.

My third quality was "technical knowledge." And for my example I'll take a salesman who called at my office a couple of weeks ago. He was trying to interest me in a well known machine used to produce an insecticide fog. One argument he used for a fog machine was that it would leave an invisible layer of minute drops of insecticide on all surfaces and flies would be killed over a long period. He said this fog method was much better than a residual insecticide in comparatively large droplets as applied by a sprayer. He then said, "You know flies have very good eyesight; much better than humans, they can see the sprayer droplets and walk around them, but they can't see the deposit left by the fog, will walk over them and be killed." I think that company needs at least a new salesman; although perhaps lots of people believe his story.

My last quality was "honesty and integrity." I will not take the time to discuss it but only comment, if you haven't got that you haven't anything.

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organization news

Delegates to the first **Illinois PCO Conference** pause for a minute from their busy schedule to pose for a group picture, in the Adult Education Center on the University of Illinois's Monticello campus. The April 9-10 meeting was sponsored jointly by the Illinois Natural History Survey and the University Business Management Service.

New England PCA Holds Suppliers' Night

Members of the New England Pest Control Association held a Suppliers' Night Thursday, May 13 at the University Club, Trinity Place, Boston, Mass.

Eleven companies who handle pest control chemicals and equipment set up product displays and had technical representatives present.

Firms participating in the Suppliers' Night were: B. & G. Company, Philadelphia, Pa.; Chemical Insecticide Company, Brooklyn, N. Y.; E. I. duPont de Nemours & Company, Wilmington, Delaware; Mine Safety Appliances Company, Pittsburgh, Pa.; S. B. Penick & Company, New York, N. Y.; Pest Control Equipment Co., New York, N. Y.; John Powell & Company, New York, N. Y.; Residex Corporation, Newark, New Jersey; Virginia Smelting Company, West Norfolk, Va.; B. & D. A. Weisburger, New York, N. Y.; and Wood Treating Chemicals Company, St. Louis, Mo.

After delegates visited the equipment displays, they held a cocktail hour followed by a Yankee pot roast dinner. During the evening R. E. Kious, National Pest Control Association public relations director, spoke on the NPCA public relations program.

Ga. PCA Meet, June 18-19

The Georgia Pest Control Association will hold a meeting June 18-19 at the DeSoto Beach Hotel, Savannah Beach, Ga. All members planning to attend are urged to write Mr. Howard Snyder, manager of the DeSoto for room reservations. Possible state-level legislation will be discussed.

Sales ten times cost of booth. These seven Wichita PCOs financed a booth at the recent Wichita Home Show at a cost of $250. 467 leads for termite jobs came in during the three-day meeting, and during the first four weeks afterwards over $2500 in business had been signed. Co-sponsors of the booth shown above are (left to right) Clifford Robinson, Frank Hilger, Bill Hawks, Glen Armstrong, D. C. Scott, Robert Zorn and Dick Evans.

CALENDAR OF MEETINGS

Pest Control Operators of California, Inc., Mid Year Conference, Santa Barbara, June 4-6.

Eastern Pa. Pest Control Assn. and Western Pa. Pest Control Assn., Joint Meeting, Harrisburg, June 10.

Florida Pest Control Assn. Convention, Tides Hotel, St. Petersburg, June 11-12.

Houston (Texas) Pest Control Assn. Monthly Meeting, June 14.

Professional Exterminators Assn. Monthly Meeting, Hotel Governor Clinton, New York City, June 14.

Florida Pest Control Licensing Examinations, Hillsboro Hotel, Florida and Twiggs St., Tampa, June 14-16.

New Jersey Pest Control Assn. Monthly Meeting, Department of Entomology, Rutgers University, New Brunswick, June 16.

Northwest Pest Control Assn. Monthly Meeting, The Standard Club, 726 2nd Ave., Minneapolis, Minn., June 17.

Georgia Pest Control Assn. Meeting, DeSoto Hotel, Savanah Beach, June 18-19.

North Carolina Pest Control Assn. Meeting, Carolina Beach, June 18-20.

Soil Microbiology Conference, Purdue University, Lafayette, Ind., June 22-24.

Texas A. & M. College Pest Control Short Course, College Station, June 25.

Texas Pest Control Assn. Summer Quarterly Meeting, Texas A. & M. College, College Station, June 26.

Arkansas Pest Control Licensing Examinations, State Plant Board, Capitol Ave. and Center, Little Rock, July 5.

Virginia State Pest Control Assn. Meeting, Place to be announced, Aug. 20-21.

Alabama Pest Control Assn. Meeting, Whitley Hotel, Montgomery, Sept. 11.

Alabama Pest Control Licensing Examinations, Birmingham, Decatur, Gadsen, Mobile, Montgomery, Sept. 21.

National Pest Control Assn. Convention, diLido Hotel, Miami Beach, Oct. 17-21.

CSMA 41st Annual Meeting, Hotel New Yorker, New York City, Dec. 5-7.

NYPCA, PEA Honor Buettner

Two pest control associations honored the memory of the late William O. Buettner, past executive secretary of the NPCA, on Sunday, May 9. The New York Pest Control Association and the Professional Exterminators Association had flowers placed at the pulpit and lectern of the Glen Ridge, N. J., Congregational Church in observance of Mr. Buettner's birthday.

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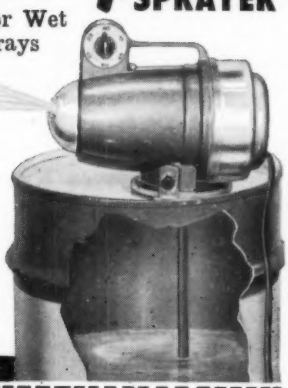

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PEST CONTROL MAGAZINE

PERSONAL BRIEFS

A special bouquet goes to **Herman Militzer** of H. & M. Laboratories in Toledo, Ohio, for the splendid job he is doing as director of public relations for the Ohio PCA, and especially for his monthly news sheet . . . **Helen Buettner** visited our home state recently when she visited **Doc and Mrs. Steckel** in Columbus . . . Caught **John Roach** of Beverly Termite Control Service in Los Angeles, painting the exterior of his modern building recently. Only in California can one use such brilliant greens and have them look bright and John did it . . . Official count is in. 180 attended the Arwell Seminar on sanitation and pest control in Chicago. Guess kudos go to **W. W. Scott's** boys for putting on a good program . . . **E. M. Arndt** president of Abco, Inc. in East Orange, N. J. writes us **Harry E. Brown,** company secretary, has been elected to the board of directors . . . To the list of ladies in pest control add the name of **Shirley Huff,** of Orkin in Bowling Green, Kentucky . . . Anybody got a good home for sale in the New York area? NPCA PR director **Zeke Kious** hasn't been able to bring his family up from Washington and has been batching it at the Latham Hotel in Manhattan since he's been on the payroll . . . When we visited **E. F. Sennewald** in St. Louis recently we were surprised that the "old chemical peddler" has as his secretary his very charming wife. It's easy to see **Mrs. Sennewald** is the brains behind that outfit . . . Best news of the year is that **Arnold Mallis' "Handbook of Pest Control"** is out at last. Our faces have been red ever since we announced in October that it would be ready late in November. We were constantly in touch with the publishers and were told it would be out for sure "next month." But there were reasons for the delay. Readers who have already ordered the $9.25 book will be well rewarded for their patience. Originally advertised as a 700-pager, the finished product now has over 1,000 pages and 237 illustrations! It's terrific. Many companies have ordered one for each serviceman. You can't make a better investment! . . . Have you seen the way **Whitmire Laboratories** is plugging PCOs in their trade magazine advertising? They're referring customers for their D.A.I. aerosols to PCOs. Nice cooperation from this supplier.

CLASSIFIED ADVERTISEMENTS

When answering ads where box number only is given, please address as follows: Box number, c/o Pest Control, 1900 Euclid Avenue, Cleveland 15, Ohio.

Rates: "Position Wanted" 5c per word, minimum, $1.00. All other classifications, 10c per word, minimum $2.00. All classified ads must be received by Publisher at least three weeks preceding publication date and be accompanied by cash or money order covering full payment.

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WANTED

Cash for your exterminating business or accounts located in Chicago, Joliet, Elgin areas. Write Box 331 Pest Control magazine.

WANTED

Top price paid for exterminating business located in New York and surrounding areas. Call Circle 6-1544.

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Pest control business established 1929 with fine reputation and best type clientele. Located central Colorado. Has national termite control franchise covering state of Colorado. Sales approximately $35,000 annually. Location housing business may also be purchased. Owner's health demands lower altitude. Box 341 Pest Control magazine.

FOR SALE

1949 Tifa fogger, with or without 1946 jeep. Used very little. Good condition. Also Kil-Jet fogger. Box 340 Pest Control magazine.

FOR SALE

Dyna Fog machine, extra equipment. Purchased new summer 1953, used under 40 hours. Excellent condition, must sacrifice. Albert Green, 141 Sprucewood Drive, Levittown, N. Y.

FOR SALE

Kil-Jet fog applicator like new. Only used two or three times. Cost $240. Asking $125.00. C. F. Huff, 2121 Gulf Blvd., Clearwater, Fla.

FOR SALE

Termite-Pest Control in Oklahoma City. Established 23 years. 123 yearly contract accounts. Should net $10,000 per year. Tops in field. Write 224-26 Oklahoma Natural Bldg., Oklahoma City, Okla., Knapton Business Brokers, Inc.

FOR SALE

Established termite control business. Pest control could be added. We are an old established business with an excellent reputation. Buy our equipment for $5,000 cash and we will take the renewals for one year. Real estate available if wanted. Write care Anserphone, 23 E. Indian School Rd., Phoenix, Ariz.

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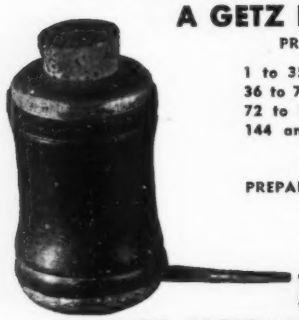
A GETZ Blower



PRICES TO THE TRADE

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144 and over	.95 each

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Consultant

on the Control of Termites, Wood-Boring Insects and Wood Preservation

(1) Advice on Job $50.00 per day and expenses. ¼ day minimum.
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Dr. Thomas E. Snyder

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Telephone: DUpont 7-3757

If you sell **ANYTHING** used in rat and mouse control, read this important message about the

July
RAT CONTROL
issue of PEST CONTROL magazine

Terrific Sales Opportunity!

Whatever you manufacture or sell for rodent control, be it rodenticides, bait boxes, traps, etc., you'll get **extra profitable business** by placing an advertisement in the July Rat Control issue of PEST CONTROL that'll be right up your alley with sales-pulling power. Your audience will be perfect, too: pest control operators, supervisors of sanitation programs in large food handling plants, communities and in the Army, Navy and Marine Corps, public health officials and others who are paid to get rid of insects and rodents. They're all quantity users of pest control supplies.

Outstanding, Special Reader-Interest Assured

The most significant array of important articles on rodent control we have ever published will be included in this number. A very important and impressive article on rodent filth in food processing by Walter W. Dykstra of the U. S. Fish & Wildlife Service is but one. Another that'll be referred to over and over again is a complete listing of the best motion pictures, slide films and booklets on rodent control. How the city of Cleveland runs an area rat control campaign is explained in another article. As an extra, readers will see through pictures and text, how to hire a new employee. In the TERMITES section operators will discover more sales helps and an article on Insect Detection by Dr. Thomas E. Snyder. But the major emphasis will be on rodents.

Advertisements Will Face These Articles!

Ads will be sandwiched-in between this interest-packed editorial copy and pictures to assure first-rate readership among our better than 4,000 readers who depend upon PEST CONTROL for reliable sources of supply.

Closing Date: June 15th

Good positions are still available, but please let us know by letter, telephone, or wire collect how much space we should save for you in this business-getting issue.

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PEST CONTROL

NOW read by over 4,000 in the urban and industrial pest control industry every month.

1900 EUCLID AVE. **CLEVELAND 15, OHIO**

pestales

It's For the Bugs

A Columbia, Mo., man is spending 30 days in the local calaboose just because he wanted to get rid of bedbugs.

He explained to the judge that a mixture of gasoline and mothballs is a wonderful way to exterminate these insects.

But that didn't sway His Honor a bit. He informed the prisoner that the next time he wanted to make up his own pest control formulas not to siphon the gas from someone else's tank.

Wonder what ever happened to the bedbugs?

* * *

Skunked!

A young Iowa lad recently set himself up in the exterminating business for money. What else?

Armed with a rifle and lots of energy he bagged an animal on which "friends" told him a bounty was being paid. Proudly he walked into the county auditor's office with his kill. But the office air turned blue and the youngster fled.

Iowa doesn't pay a bounty on skunks.

* * *

Of Mice and Milk

A mouse recently brought $257 to a lady in Ephrata, Wash.

Seems this little fellow was floating in a carton of milk she bought from a local dairy company.

Lady charged this experience brought her both shock and pain —a charge backed up by a superior court which decided in her favor.

How shocked can you get?

Ky. PCOA Formed

Industry members in the state of Kentucky have formed the Kentucky Pest Control Operators Association. J. Harvey Sturgeon, president of Sturgeon Pest Control, Inc., Louisville, is president.

Other officers are: vice president Lester M. Levin; secretary, William Hargan; attorney, Theodor Wurmser; directors, Verlon Gosser, Robert Yeager and Herbert Levin.

WHAT IS IT ?

Answers to descriptions of three pest damage on page 41.

A. The Cadelle. B. Mediterranean flour moth larvae. C. Indian meal moth larvae.

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"SAFETY SENSITIVE" AREAS OF PEST CONTROL CALL FOR Pyrenone*

—Say Officials of Lien Chemical Company

Effective pest control calls for quick knockdown and kill, yet without toxic hazards in many of the "safety sensitive" areas in which these effective insecticides are needed. That's why Pyrenone-based materials are a key part of the program of treatments used by Lien Chemical Company, 9229 W. Grand Avenue, Franklin Park, Ill.

The Lien company operates in Chicago, Milwaukee, Rockford and South Bend, and has recently opened in Miami, Fla. Its president, Carl B. Lien, is a former president of the National Sanitary Supply Association. "Keep Clean with Lien" is the slogan of the company, and Pyrenone helps make the claim come true.

Pest control problems vary so greatly from one job to another that the versatility of Pyrenone – in formulation, in methods of application and in compatability with other chemicals – gives it a keystone position in building a planned program of insect control.

Are you making the most of Pyrenone in your pest control program? Contact the U.S.I. office nearest you for information on how Pyrenone can be more helpful to you.

Typical of the "safety sensitive" areas serviced by Lien Chemical Company is Tillman's Grill, a restaurant in Franklin Park, Ill. Above, Lien Serviceman Russell Stromsta sprays a Pyrenone-base insecticide as E. R. Tillman watches, assured of no toxic hazards.

Fred Batson, Lien company's entomologist, briefs Serviceman Stromsta on the advantages of Pyrenone-base sprays for effective pest control without toxic hazards. Versatile Pyrenone makes insecticides of varying ratios of ingredients to meet a wide range of requirements.

Carl B. Lien, company president, and A. E. Stahnke, purchasing agent, review the company's pest control programs and requirements for safe, effective insecticides.

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STAINLESS STEEL TANK TYPE SPRAYER

A 3 gallon stainless steel unit that is built for service! Economical and efficient in operation. CHECK THESE FEATURES: All mechanical seals — no soldered inlets — leakproof valve gauge with unbreakable crystal — stainless steel 3 gal. tank and pump by Hudson. Renewable hose end adapters — 5 ft. PCE oil-resistant hose ¼" I.D. — 18" PCE extension wand — fan pattern spray nozzle — Knapsack type web strap.

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The finest 1 qt. job we've ever seen. The nozzle on any of your PCE sprayers is interchangeable with the nozzle on this job. A sturdy, well constructed sprayer that withstands the corrosive action of water-based insecticides.

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PCE is factory distributor for Spraying Systems Co. specialized nozzles for the PCO — at new low factory established prices. Write for prices.

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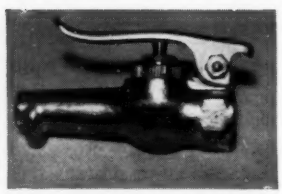

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Shut-off	**$2.75**
Quick-opening	**$9.70**

2 QT. RESIDUAL APPLICATOR

$27.00

Here's a lot of sprayer for the money. Chrome finished all brass tank. Easy to clean. Professional in appearance. Has top-mounted easy-to-read pressure gauge with unbreakable crystal. Easy top fill. Check valve prevents dripping or accidental discharge when extension is removed. No soldered inlets. ALL MECHHANICAL SEALS WITH OIL AND CHEMICAL RESISTANT RINGS. Can be operated with one hand.

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